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Economic Impact Report

REPORT TO
ARAFURA RESOURCES LTD

18 MARCH 2016

THE ECONOMIC IMPACT OF THE PROPOSED NOLANS PROJECT



FINAL REPORT



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1.1 Project details

Arafura Resources Limited proposes to develop the Nolans Rare Earth Project (the Nolans Project) to target the Nolans Bore mineral deposit for rare earth elements.

Project activities include the construction, mining, processing, rehabilitation and decommissioning of an open-cut, rare earth mine, and associated infrastructure.

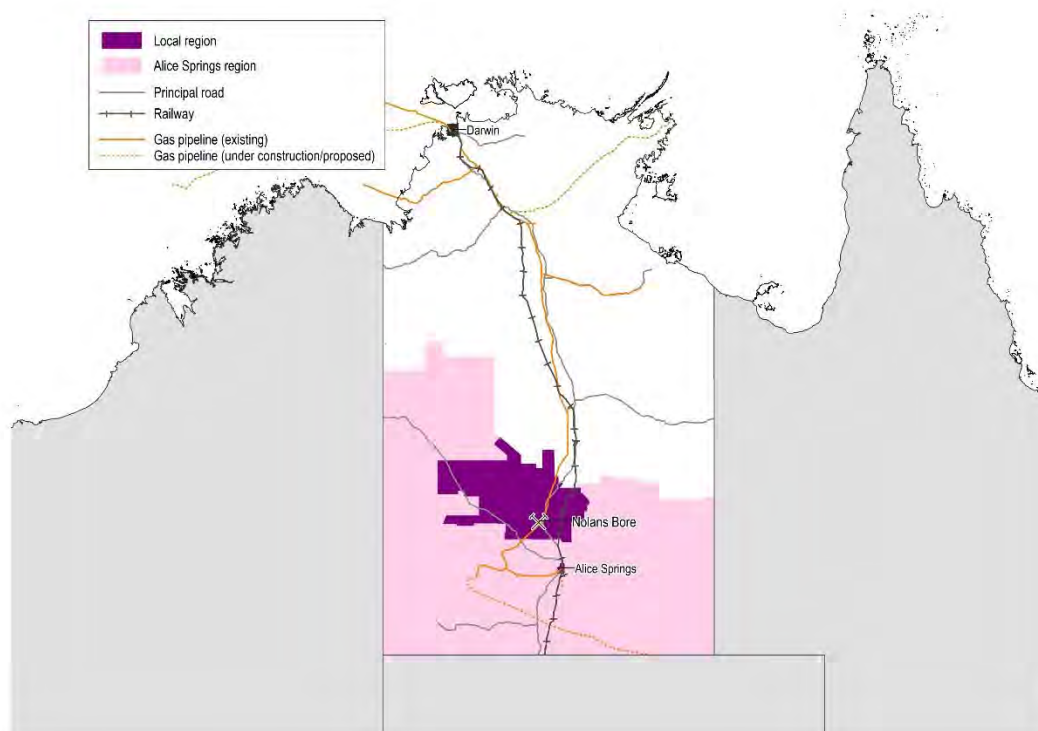
Mining operations will be undertaken using conventional open pit methods (drill, blast, load and haul) to mine up to 1,100,000 tonnes of ore per annum. Ore will be beneficiated onsite to produce a mineral concentrate that will be pumped approximately 8 km south to an intermediate chemical processing plant. A mixed rare earths intermediate concentrate will be transported by road to Alice Springs then railed to East Arm Port for export. Further processing of this concentrate into five final rare earth products will occur at an offshore refinery in an established chemical precinct. The Nolans Bore deposit also contains thorium and uranium, which will be removed during intermediate processing and stored in an onsite waste disposal facility.

The operational life of the Nolans Project is expected to be in excess of 40 years with rare earths production anticipated to be approximately 20,000 tonnes per annum. Steady state production is expected to be achieved within three years of operation.

1.2 Location

The Nolans Project comprises mining, ore beneficiation and intermediate chemical processing facilities. The Project is located approximately 135 km north north-west of Alice Springs in the Northern Territory as illustrated in **Figure 1.1**. The mine site is 10 km west of the all-weather and bituminized Stuart Highway that links Darwin to Alice Springs and South Australia, and the Amadeus Basin to Darwin gas pipeline that supplies a number of power stations with natural gas runs alongside the intermediate processing site. The Adelaide to Darwin rail line (AustralAsia Railway) passes 60 km to the east of the Project.

The closest major population and service centre to the Project is the town of Alice Springs which is accessible via the Stuart Highway. Ti Tree and Laramba are the next closest settlements located around 55 km north north east and 50 km west north west from the mine site respectively and, as of the 2011 Census, were home to around 123 and 251 people respectively. The nearest population is located at Alyuen which is a small Aboriginal community located near the Aileron Roadhouse.

FIGURE 1.1 LOCATION OF PROPOSED NOLANS PROJECT

SOURCE: ACIL ALLEN CONSULTING

Land tenure

Exploration title over the Project's mine and intermediate processing sites is held under Exploration Licences 28473, 28498 and 29509, covering approximately 735 km². The Project lies wholly within NT Portion 703, Perpetual Pastoral Lease 1097 "Aileron", held by Aileron Pastoral Holdings Pty Ltd.

Arafura has negotiated and executed an exploration agreement with the Central Land Council (on behalf of registered Native Title Claimants). As a result, there are no Native Title impediments to continued exploration on the above listed Exploration Licences.

Prior to commencement of mining at Nolans an access agreement is required to be negotiated with the holder of the pastoral lease (in accordance with the NT Mineral Titles Act), and a community benefits agreement with the registered Native Title Claimants (in accordance with the Native Title Act). A mining tenement can only be granted where an appropriate Native Title agreement has been negotiated.

1.3 Data sources

Project data for the construction and operation phases of the Nolans Project described in this report was sourced from Arafura.

All other data regarding the description of the economy and key economic variables has been sourced from publicly available sources. The primary source of data is the Australian Bureau of Statistics including the 2011 Census as well as other updated information held by this agency relating to population and gross territory product. All workforce size and unemployment data is sourced from the Department of Employment.

Data for this report has been collected for the following statistical areas which have been referred to as:

- **Northern Territory** – as defined by the boundaries of the Northern Territory.

- **Alice Springs region** – as defined by the Australian Bureau of Statistics SA3 area. This region comprises of an area of 569,566km² and includes the following Local region. Economic modelling was conducted at the Alice Springs region.
- **Local region** – as defined by the Yuendumu – Anmatjere SA2 area as defined by the Australian Bureau of Statistics in addition to the Alice Springs Local Government Area. Together they comprise an area of 72,169km².

1.4 Major assumptions

When reading and interpreting this report, a number of key assumptions should be taken into consideration:

- all company data is based on indicative estimates as of December 2015
- all data is presented in calendar years
- all data is presented in Australian dollars
- all data is presented in real dollars. This means that its value has been adjusted for inflation
- the term *Nolans Project* refers to both the construction and asset operations phases of the Nolans Project
- all operations employment figures exclude temporary employees associated with activities such as planned shutdown maintenance and ad hoc scopes of work
- *life of the Project* refers to the three years of construction of the Nolans Project from 2017 to 2019 inclusive plus 20 years of operations from 2020 to 2039.

1.4.1 Statement on data

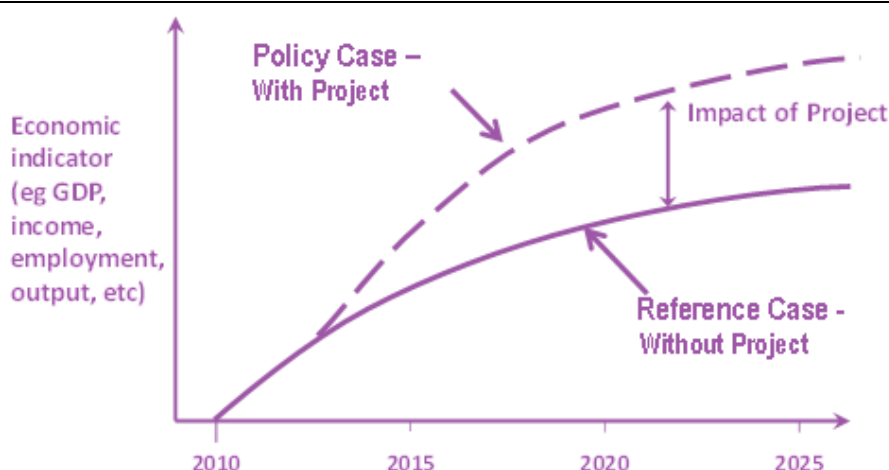
The Project data included in this report are best estimates of capital and operating expenditure and are supplied by Arafura. All local content estimates including for Project expenses and for labour have been estimated by Arafura Resources based on current knowledge of the Project and the operating environment in the region, the Northern Territory and in Australia.

Note that the estimates of local content spending and of employment do not provide commitments to local content or employment. It is possible that spending patterns and labour requirements may change over the course of the construction and operation phases of the Nolans Project.

1.5 Economic modelling

Economic modelling was undertaken using Computable General Equilibrium modelling. For this analysis, ACIL Allen's Computable General Equilibrium model, *Tasman Global*, was used to estimate the impacts of the construction and operation activities associated with the Nolans Project.

In applications of the *Tasman Global* model, a Reference Case simulation forms a 'business-as-usual' basis with which to compare the results of various simulations. The Reference Case provides projections of growth in the absence of the Nolans Project in terms of Gross Product, population, labour supply, industry output and so on and provides projections of endogenous variables such as productivity changes and consumer tastes. The Policy Case assumes all productivity improvements, tax rates and consumer preferences change as per the Reference Case projections but also includes the impacts of the proposed Nolans Project. The two scenarios give two projections of the economy and the net impact of the Nolans Project is then calculated as deviations from the Reference Case as illustrated in **Figure 1.2**.

FIGURE 1.2 ILLUSTRATIVE SCENARIO ANALYSIS USING *TASMAN GLOBAL*

SOURCE: ACIL ALLEN

Further details of the *Tasman Global* model can be found in Appendix A.

Economic modelling for the Nolans Project was undertaken for the construction and operation phases of the Project where data for the operations phase was provided for a 25 year period. In total, 23 years of data was modelled including three of construction. Three regions were modelled as required by the NT EPA (Northern Territory Environmental Protection Authority, 2015). These regions are:

- The Alice Springs region as defined by the Australian Bureau of Statistics SA3 area
- The Northern Territory
- Australia.

1.6 Glossary of key economic terms

All economic impact results are presented in terms of the direct plus the indirect (or flow on) impact of the Nolans Project. This indirect impact is often referred to in other forums as the multiplier effect. This indirect impact embodies the effect of changes in demands from other industries which is caused when the initial impact from the construction and operations of a new project leads to more spending in the economy which creates more income and taxes which leads to further spending and so on.

Gross Product or real economic output

A measure of the increase in the size of an economy

Real economic output is a measure of the output generated by an economy over a period of time (typically a year). It represents the total dollar value of all goods and services produced over a specific time period and is considered as a measure of the size of the economy. At a national level, real economic output is referred to as Gross Domestic Product (GDP). At the state level, economic output (or GDP equivalent) is called Gross State Product (GSP) while at a regional level is usually called Gross Regional Product (GRP).

Real income

A measure of the welfare of residents in an economy or the increase in ability to purchase goods and services and to accumulate wealth

Although changes in real economic output are useful measures for estimating how much the output of the economy may change due to the Nolans Project, changes in real income are also important as they provide an indication of the change in economic welfare of the residents of a region through their ability to purchase goods and services.

Real income measures the income available for final consumption and saving after adjusting for inflation. An increase in real income means that there has been a rise in the capacity for consumption as well as a rise in the ability to accumulate wealth in the form of financial and other assets. The change in real income from a development is a measure of the change in welfare of an economy.

Real employment

The number of net full time equivalent job years created as a result of a project

Real employment is the direct and indirect (flow on) employment as a result of a project. The impact is created as a result of spending in the economy to construct and operate a project. It is a **net** effect meaning that it takes into account transfers of labour from one job to another (crowding out effects).

Job years

Real employment is measured in job years. A job year is employment of one full time equivalent (FTE) person for one year. Alternatively it can be expressed as one 0.5 FTE person for two years.

Net present value

The value of a future stream of income (or expenses) converted into current terms by an assumed annual discount rate. The underlying premise is that receiving, say, \$100 in 10 years is not 'worth' the same (i.e. is less desirable) than receiving \$100 today.

Real and nominal dollars

Nominal dollars are dollars that are expressed in the actual dollars that are spent or earned in each year, including inflation effects. Real dollars have been adjusted to exclude any inflationary effects and therefore allow better comparison of economic impacts in different years. Over time, price inflation erodes the purchasing power of a dollar thereby making the comparison of a dollar of income in 2040 with a dollar of income in 2015 invalid. Adjusting nominal dollars into real dollars overcomes this problem.

1.7 Acronyms

A number of acronyms are used throughout this report. These and their meaning are presented in the following table.

ABS	Australian Bureau of Statistics
AUD or \$	Australian dollars
billion	Billion measured by 1×10^9 (or 1,000 million) as per the US convention
CGE	Computable General Equilibrium (model)
FIFO	Fly in-fly out work practice
FTE	Full time equivalent
GDP	Gross Domestic Product
GRP	Gross Regional Product
GSP	Gross State Product

1.8 Report structure

This economic impact report describes the economic impacts of the Nolans Project on the Northern Territory, the Alice Springs region and the Local region. The report aims to address the NT EPA Guidelines for the Preparation of an Economic and Social Impact Assessment for the Nolans Rare Earth Development (Northern Territory Environmental Protection Authority, 2015).

The report begins by outlining the historical and projected economic and socioeconomic baseline data of the Northern Territory, the Alice Springs region and the Local region. This Chapter uses latest publicly available data to describe the economy including the population, key industries, the characteristics of the workforce. This baseline will be used to provide context around the economic modelling and to provide a measure against which the economic impacts can be described. Chapter 3 then describes the economic impact of the Nolans Project using economic modelling and other economic analysis.

Chapter 4 provides a summary of the key findings of the report while Appendix A provides a description of the Tasman Global Model and its key assumptions. This model is the *Tasman Global* Computable General Equilibrium model used to estimate the economic impact of the Nolans Project.



2.1 Population

The estimated resident population of the Northern Territory is currently (as of 30 June 2014) just over 245,000 people with the majority of the population concentrated around the capital city of Darwin, and the central Australian town of Alice Springs. The population of the Local Government Area of Alice Springs is 28,667 people of whom most live in the town of Alice Springs. This is equivalent to 12 per cent of the population of the Territory.

The estimated population of the Alice Springs region is currently around 41,700 persons which is equivalent to 17 per cent of the population of the Northern Territory. The population of the Local region is around 31,100 or 13 per cent of the population of the Territory. The high population of the Local region is due to the inclusion of the Alice Springs Local Government Area within its boundaries. The Local Government Area makes up 92 per cent of the population of the Local region with the remainder of the population comprised of the town of Ti Tree, and small communities such as those located at Laramba and Alyuen. **Table 2.1** shows estimates of the population of areas surrounding the Nolans Project.

TABLE 2.1 POPULATION ESTIMATES (30 JUNE 2014)

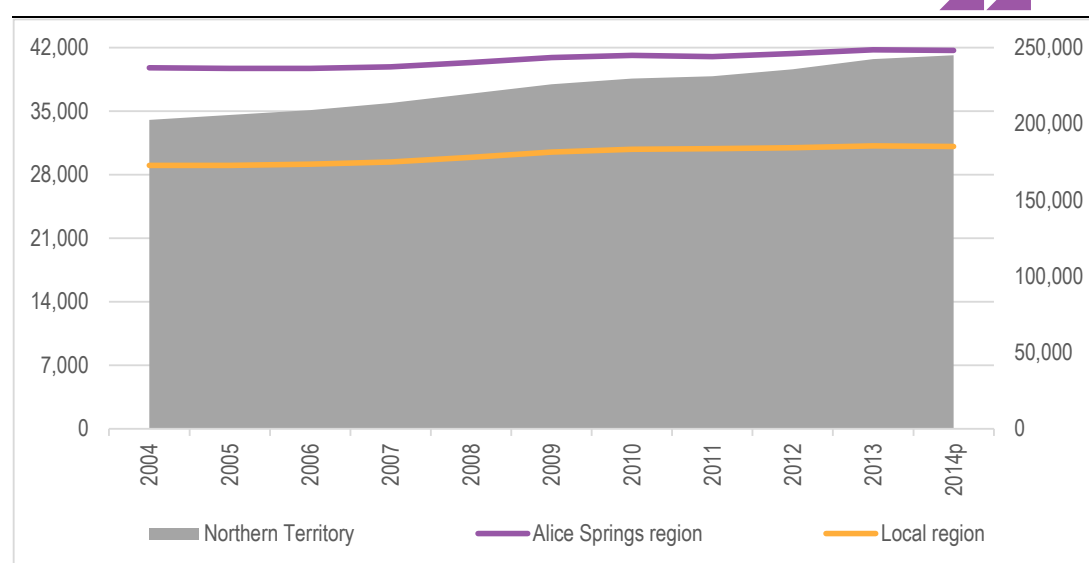
Location	Population
Northern Territory	245,000
Alice Springs (LGA)	28,667
Ti Tree	140
Laramba	251
Alyuen	Less than 100

SOURCE: ACIL ALLEN CONSULTING

In terms of population density, the Alice Springs region is home to around 0.1 person per km² and the Local region is home to 0.05 persons per km².

Figure.2.1 shows the estimated resident population of the Northern Territory, the Alice Springs region and the Local region. The Figure shows that the population of the Alice Springs region has experienced slight growth of around 0.5 per cent per annum since 2004. The Local region has experienced slightly higher growth of 0.7 per cent per annum as a result of increases in the population of the town of Alice Springs. In the areas outside of the town, there has been no recorded population growth. In comparison, the population of the Northern Territory has risen by an average of 1.7 per cent per annum over the same period as a result of increases in Darwin (Australian Bureau of Statistics, 2015).

FIGURE.2.1 ESTIMATED RESIDENT POPULATION: NORTHERN TERRITORY, ALICE SPRINGS REGION AND LOCAL REGION (2004 – 2014)



SOURCE: AUSTRALIAN BUREAU OF STATISTICS CAT 3218.0. ESTIMATED RESIDENT POPULATION

NOTE: P = PRELIMINARY ESTIMATION

2.1.1 Population forecasts

Table 2.2 shows the population of selected areas of relevance to the Nolans Project along with their recent population growth and estimates of their expected growth over the period to 2018-19. The Table shows that the Alice Springs Local Government Area is expected to increase by an average of around 1.6 per cent per annum based in population forecasts for the Alice Springs region published by the Northern Territory Government (NT Government, 2015). This projected rate of growth is significantly higher than historical growth. The population of the Northern Territory is expected to increase at around 1.7 per cent per annum in line with the historical year year annual average population growth.

TABLE 2.2 POPULATION AND POPULATION GROWTH ESTIMATES

Location	Population	Population growth 2013-2014	Population growth forecast (2013-14 to 2018-19)	Population forecast (2018-19)
Northern Territory	245,000	1.0%	1.7% per annum	261,966
Alice Springs region	41,711	-0.1%	1.7% per annum	46,919*
Local region	31,127	-0.2%	1.4% per annum*	33,940*
Alice Springs (LGA)	28,667	-0.2%	1.6% per annum	31,280

SOURCE: (AUSTRALIAN BUREAU OF STATISTICS, 2015) (NT GOVERNMENT, 2015) * ACIL ALLEN FROM (NT GOVERNMENT, 2015)

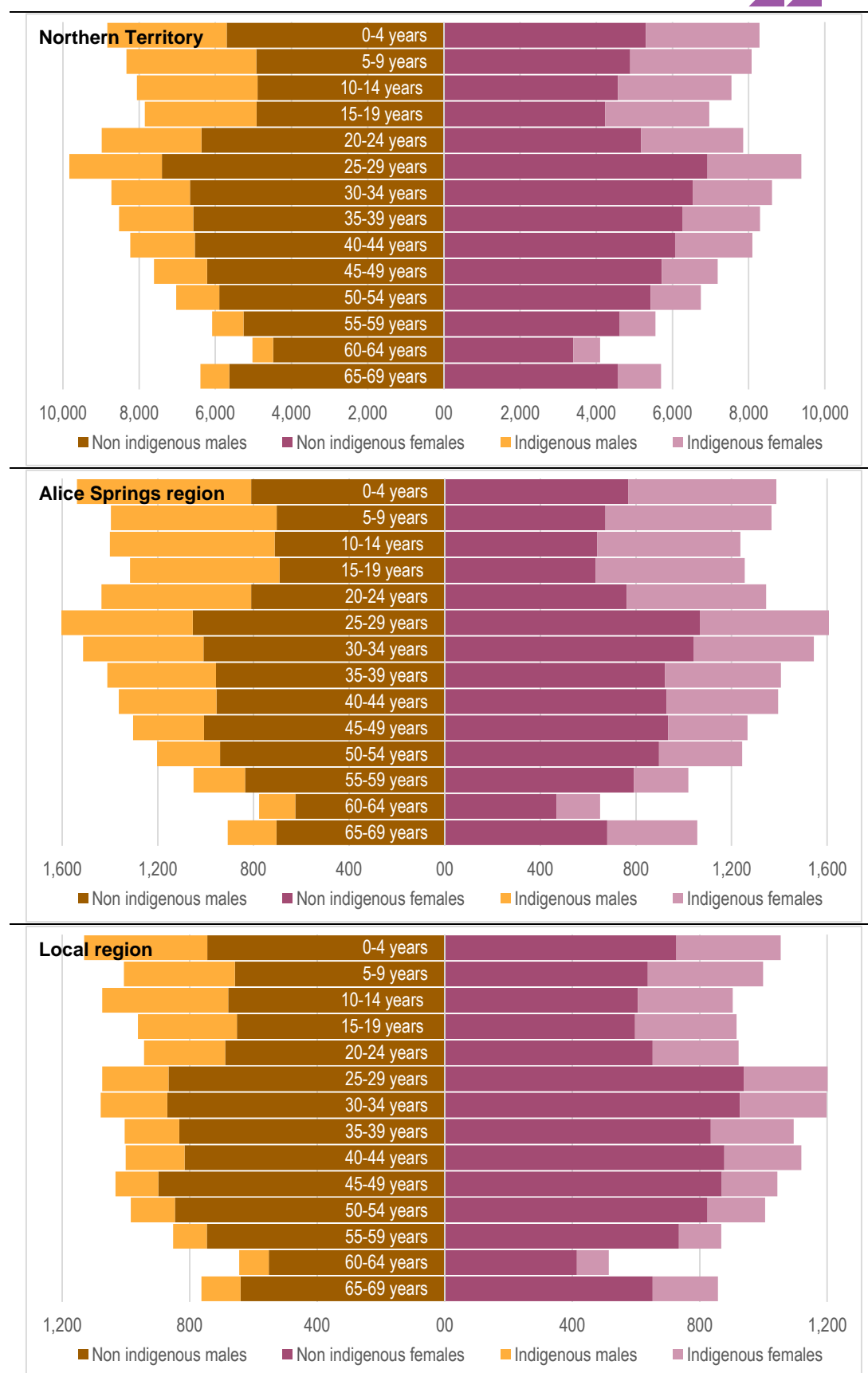
2.2 Demography

The age and gender profile of people living in the Northern Territory, the Alice Springs region and the Local region is presented in **Figure.2.2**. The Figure shows the Northern Territory and the Alice Springs region both have fairly standard population profiles which are characterised by a higher number of people of working age and are typical of larger populations. In comparison, the demographic profile of the Local region shows a comparative lack of population of working age and an over representation of children aged under 15 years in the area.

The profiles also show the large number of Indigenous people that live in the Northern Territory, particularly in the Alice Springs region. Around 27 per cent of the population of the Northern Territory

is Indigenous, while 36 per cent of the population of the Alice Springs region and 24 per cent of the Local region are Indigenous. In the immediate area of the Nolans Project which is the Yuendumu - Anmatjere SA2 area, 86 per cent of the population is Indigenous.

FIGURE.2.2 AGE AND GENDER PROFILE: INDIGENOUS AND NON INDIGENOUS PEOPLE:
NORTHERN TERRITORY, ALICE SPRINGS REGION AND LOCAL REGION



SOURCE: AUSTRALIAN BUREAU OF STATISTICS 2011 CENSUS DATA BY PLACE OF USUAL RESIDENCE. NON INDIGENOUS INCLUDES PERSONS WHO DID NOT STATE THEIR CULTURAL BACKGROUND

2.3 Infrastructure

Darwin

Darwin is the main population centre in the Northern Territory and is the key government and services sector for the Northern Territory. It offers a modern standard of living and a high standard of social infrastructure expected of a city.

The city is a significant part of the AustralAsia Trade Route, which includes: the AustralAsia Railway that links Darwin to the national rail network, an expanded East Arm Port, abundant industrial land at the adjoining Darwin Business Park and a growing number of shipping links with Asia.

Darwin is becoming an important supply, service and distribution base for major minerals and energy projects in north Australia, the Timor Sea and South-East Asia. In the near term, significant investment from the INPEX Ichthys LNG Project which is currently under construction, the Darwin Marine Supply Base and the Defence Support Hub will continue to underpin the continued rapid growth in the Darwin economy. At the same time, large lifestyle developments such as the Darwin Waterfront Precinct will enhance the social, cultural and general liveability aspects of the city for residents and tourists.

Alice Springs

Alice Springs is the largest population centre in central Australia and is the service centre for the surrounding region. It is well serviced by transport infrastructure due to its location on the Stuart Highway and the Adelaide to Darwin railway. The Alice Springs Airport is the major airport for the region providing air links to all of the mainland capital cities in Australia as well services to Cairns, Tennant Creek and Uluru.

Alice Springs is a modern and well catered for town with a good level of social infrastructure. Facilities include a teaching hospital, a university, childcare facilities, several high schools, numerous primary and preschools, a library and a variety of recreational facilities including two shopping malls and an aquatic centre. There are campuses of the Charles Darwin University and the Batchelor Institute located in town as well as a number of registered training providers. The town is the base of the Royal Flying Doctor service which provides 24-hour primary emergency retrievals and inter-hospital transfers.

There is a public transport service that services areas within the town.

Ti Tree

Ti Tree is a small town located 194 km north of Alice Springs on the Stuart Highway. It is the service centre for a number of surrounding communities including Alyuen which along with Laramba and Ti Tree are the closest settlements to the Nolans Project.

The town of Ti Tree contains a limited level of infrastructure however the facilities provided are suitable for a remote town with a small population base of around 140 people. Social infrastructure includes the Ti Tree Primary School, library, a police station, health clinic, aged care service and recreational facilities including an oval, several cafés and stores, and a bar which forms part of the Ti Tree Roadhouse. There is an aerodrome located near the town which is maintained by the Northern Territory Government. It is a 30 minute flight to Alice Springs.

The Ti Tree Primary School had enrolments in 2014 of 89 children from the surrounding communities of Ti Tree, Nyturia and Pmara Jutunta. Alternative secondary programs are available for secondary age students in the town via correspondence.

Laramba

The small Aboriginal community of Laramba is located 205 km north west of Alice Springs approximately 83 km off the Stuart Highway. There is a health clinic, store, child care centre, primary school, and recreation facilities. On the outskirts of the town is an unsealed airstrip which is maintained by the Northern Territory Government. Flights to Alice Springs take around 40 minutes.

Along with Ti Tree and Alyuen, it is the closest settlement to the Nolans Project.

2.4 Businesses

Darwin is the main service centre for the Northern Territory supporting a wide range of industries including the government sector, the oil and gas industry, mining and the defence sector. It continues to position itself as a strategic position for shipping, regional freight and as a distribution gateway. There are around 14,500 businesses in the Northern Territory as of June 2014 with the greater Darwin area home to around 71 per cent of businesses while nearly 16 per cent of businesses are located in Alice Springs (NT Department of Business, 2015).

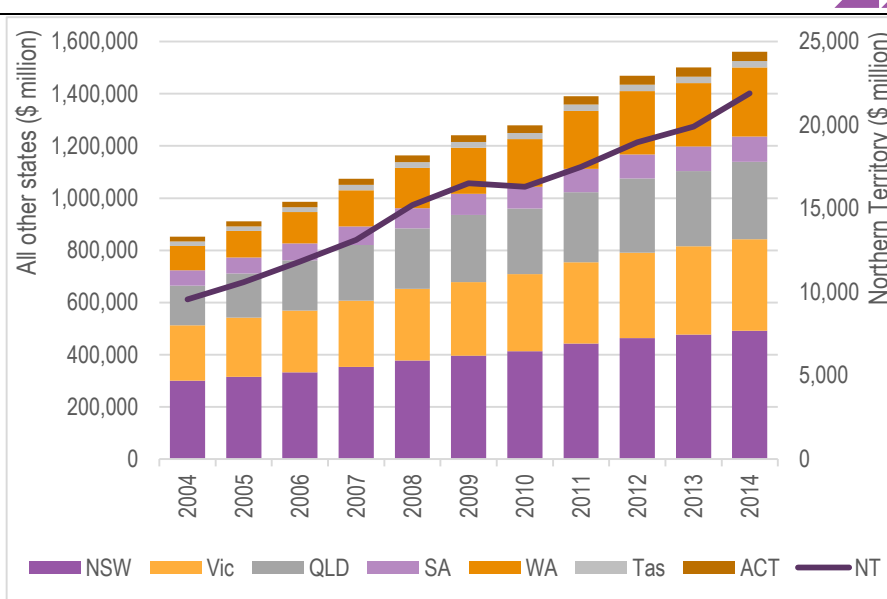
Alice Springs supports nearly 2,300 businesses including those in the construction, food and accommodation, transport and logistics, financial services and so on that can support the construction effort and the operations phase of the Nolans Project.

2.5 Overview of the economy

The value of the Gross State Product of the Northern Territory is currently \$21.9 billion (2013-14). Whilst the Territory contributes only a small share of Australia's Gross Domestic Product, it is experiencing high rates of growth as illustrated in **Figure 2.3** which shows Gross State Product by State. In the period from 2004 to 2014, the Northern Territory experienced compound annual average growth of around 4.2 per cent per annum compared to Australian Gross Domestic Product which grew by around 2.8 per cent per annum. This is the second highest growth rate of any jurisdiction in Australia with Western Australia experiencing the highest growth rate of 4.9 per cent per annum.

In the year to 2014, the growth in Gross State Product in the Territory grew by 6.5 per cent which was the highest of any jurisdiction in Australia and well above the 2.5 per cent growth in Australian Gross Domestic Product.

FIGURE 2.3 VALUE OF GROSS STATE PRODUCT BY STATE (JUNE 30)



Note: as of June 30.

SOURCE: AUSTRALIAN BUREAU OF STATISTICS CATALOGUE 5220.0 CURRENT PRICES

The Northern Territory Government forecasts economic growth in the Northern Territory to moderate from current levels to reach 4.5 per cent in 2014-15, where it will remain until 2016-17. This rate is above historical trend levels and reflects the ongoing effects of business investment in the Northern Territory. After 2015-16, the economy of the Territory is expected to transition from one of high growth led by the construction of major developments including the Ichthys Project, the Darwin Marine Supply Base and the Defence Support Hub to one of above trend growth of around 3.0 per cent per annum led by the production phases of these major investments.

In comparison, the Federal Government forecasts that Gross Domestic Product growth in Australia will remain well below forecasts for the Northern Territory. Real Gross Domestic Product growth is expected to remain constant in 2014-15 at 2.5 per cent before gradually increasing to reach 3.25 per cent in 2016-17.

2.5.1 Industry contribution

In terms of the value of industry contribution, the main industries are the construction; government and community services; and mining industries. Together, these industries account for about half of the Territory's total economic value. The largest employers are the community services; construction; and retail and wholesale trade industries.

Mining

Mining is the most significant industry in the economy of the Northern Territory accounting for 13.3 per cent of total Gross State Product in 2013-14 (NT Treasury, 2015). The major commodities are manganese, gas and liquids, and LNG production as illustrated in **Table 2.3**. There are five major producing mines in the Territory being the:

- Alcan Gove mine
- Gemco mine
- McArthur River Mine
- Tanami gold mine
- Ranger uranium mine.

TABLE 2.3 VALUE OF RESOURCES PRODUCTION NORTHERN TERRITORY (\$ MILLION)

	2012-13-	2013-14	2014-15 forecast
Manganese	1,034	1,214	1,151
Gold	376	652	409
Zinc-lead concentrate	388	339	374
Iron ore	128	219	-
Bauxite	51	126	-
Other	89	142	481
<i>Total minerals</i>	<i>2,067</i>	<i>2,692</i>	<i>2,415</i>
Oil	262	216	110
Gas and liquids	3,083	1,948	2,059
Uranium	528	136	388
<i>Total energy</i>	<i>3,873</i>	<i>2,299</i>	<i>2,557</i>
LNG	1,799	861	1,824
Alumina	693	527	537
<i>Total manufactured</i>	<i>2,492</i>	<i>1,388</i>	<i>2,361</i>
Total	8,805	6,459	7,333

SOURCE: NT TREASURY AND NT DEPARTMENT OF MINES AND ENERGY ANNUAL REPORT 2013-14. NOTE: OTHER COMPRISES CRUSHED ROCK, GRAVEL, LIMESTONE, MINERAL SPECIMEN, QUICKLIME, SAND, SOIL AND VERMICULITE

In 2013-14, the value of resources production in the Northern Territory was estimated to be \$6.4 billion, which represents a fall from the previous year of around \$2.4 billion as a result of a fall in the value of energy and manufactured products. Despite this, the value of resources is expected to recover in 2014-15 as a result of increases in energy production with the commencement of production at the Surprise and Dingo fields in Central Australia, and increased production of LNG.

There are currently two minerals projects in operation in the region surrounding the Nolans Project. The first is the Twin Bonanza Gold Mine which is a small scale gold operation located around 500 km due west of the Nolans Project. Stage two of this open cut gold mine was completed in mid-2015 and is now in operation however the mine is expected to cease operation in April 2016. The Spinifex Bore garnet sand surface mining and processing operation is another small operation which began operation in mid-2015.

There are also a number of proposed projects in the vicinity of the Nolans Project which are presented in **Table 2.4** (Northern Territory Environmental Protection Authority, 2015). The closest of these is the proposed Mt Peake Project which is located 235 km north of Alice Springs. The proposed Chandler Salt Mine is also located nearby approximately 120 km south of Alice Springs. This development is expected to begin production at the end of 2021 however construction of supporting infrastructure could commence as early as the middle of 2017.

TABLE 2.4 PROPOSED RESOURCES DEVELOPMENTS: CENTRAL NORTHERN TERRITORY

Project	Proponent	Construction start date	Operation start date	Location	Construction employment	Operation employment
Mt Peake Project - stage 1 - develop new open pit mining and processing operation to produce vanadium, titanium pigment and pig iron	TNG Limited	Q2 2016	Q2 2018	235 km north of Alice Springs	Up to 350	175 - 250
Chandler Salt Mine - develop underground mine, on-site salt and fertilizer processing plant	Tellus Holdings	Mine: Q2 2017	Q4 2021	120 km south of Alice Springs	280 - 350	180
Jervois Mine - reopen old mine with 2 open-cut pits and on - site processing plant	KGL Resources	Q2 2017	Q4 2018	Approx 270 km north-east of Alice Springs	360	300
Tanami Gold Mine expansion including second decline and increased plant capacity	Newmont	2016	2017	Approx 540 km north west of Alice Springs	na	50

SOURCE: NT GOVERNMENT (NORTHERN TERRITORY ENVIRONMENTAL PROTECTION AUTHORITY, 2015)

Government sector

The government sector in the Northern Territory provides a significant contribution to the economy through the provision of services such as Government Administration, Defence, Education and Health. In 2013-14 the government and community services industry accounted for 18.3 per cent of Territory Gross State Product. This comparatively large contribution is largely a result of the requirement to provide services to a number of small and scattered populations throughout the Northern Territory, including a large number of Aboriginal communities.

The Defence sector is a major contributor to the NT economy generating around 6.9 per cent of the Territory's Gross State Product in 2013-14 compared with 1.9 per cent of Australia's GDP. Defence spending in the Territory increased by 10.6 per cent or \$144 million to \$1.5 billion in 2013-14.

Agriculture

The Agriculture industry in the Northern Territory comprises cattle and other livestock (including buffalo, crocodiles, poultry, pigs and camels), horticulture (fruit, vegetables, nursery and cut flowers) and mixed farming (field crops, hay and seeds, and forestry). In 2013-14 the agriculture, forestry and fishing industry in the Territory accounted for 2.1 per cent of Gross State Product and 1.1 per cent of total resident employment.

The total herd in the Northern Territory is around 2.2 million cattle with the industry dominated by the live export industry. There are large herds of cattle located in the rangelands around Alice Springs.

The Northern Territory is the largest exporter of cattle in Australia producing over 500,000 cattle for the live export market in 2014-15 accounting for nearly all the turnoff from the Territory. The largest live cattle export port in Australia in terms of throughput is the Port of Darwin which exported over

613,000 cattle in 2014-15. Cattle are primarily bound for Indonesia which currently accounts for 80 per cent of the live cattle trade from the Territory. New developments including the construction of the Livingstone Abattoir in Darwin which came into production in late 2014. The abattoir has the capacity to slaughter 1,000 cattle per day or 100,000 cattle per annum and as of September 2015 was reportedly slaughtering 400 cattle per day.

Horticulture is also a key agricultural industry with the main production being fruits such as melons, bananas and mangoes; vegetables including okra, bitter melon, snake beans, pumpkin and cucumber; and cut flowers. The value of horticulture production in the Territory was estimated at \$115 million in 2013-14 including \$80 million of fruit, over \$17 million of cut flowers and \$16 million of vegetables. In the Alice Springs region the main horticulture developments are located at Alice Springs and Ti Tree. The industry in this area is based largely on grapes but also includes other crops such as melons, pumpkins, mangoes and dates. It is an important employer in the area particularly for people living in the towns and communities outside of Alice Springs.

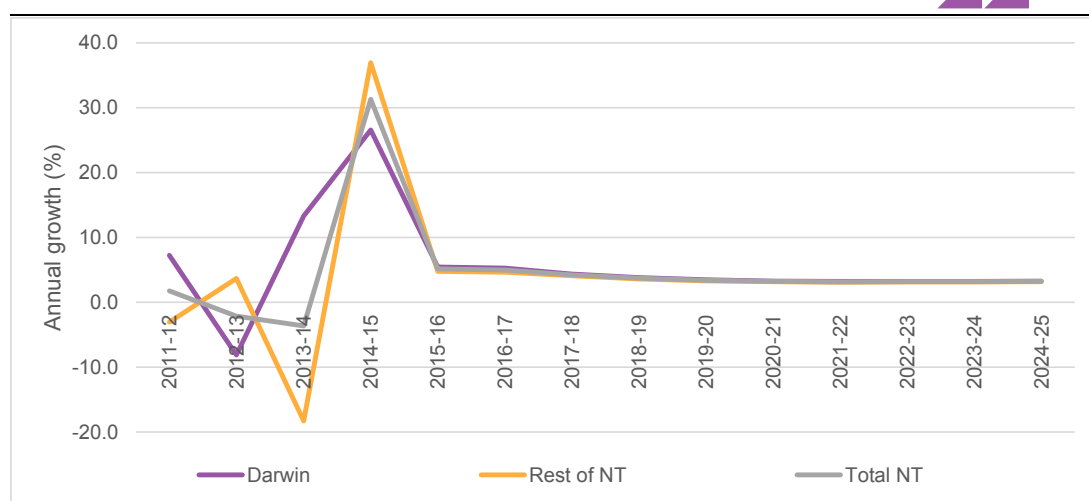
Fish production in the Territory largely comprises snapper, barramundi and shark, while crustacean production is dominated by prawns and mud crabs. The value of total fisheries production in the Territory was estimated at \$61 million in 2013-14.

Tourism

Tourism is an important component of the Northern Territory economy contributing 4.0 per cent of the Gross State Product of the Territory in 2013-14. It is also one of the largest employers in the Northern Territory providing around 8,000 jobs or 5.7 per cent of employment (NT Treasury, 2015). Much of this employment is in regional areas where there is limited economic diversification and few opportunities.

In 2014-15 there were nearly 1.5 million visitors to the Northern Territory and total visitor expenditure was nearly \$1.5 billion. In the Alice Springs and Surrounds region there were an average of 343,000 visitors per year over the period June 2013 to June 2015. This represents a stabilisation of a downward trend in visitor numbers to the region experienced since 2005 when nearly 500,000 visitors per year visited the region. **Figure 2.4** shows the historic and forecast growth in visitor nights in the Territory. It shows that there has been very strong growth in the number of visitor nights in the Territory in 2014-15 of over 30 per cent however long term projections of visitor growth are expected to remain at more conservative levels. Over the five years to 2019-20, the average number of visitor nights is expected to grow by around 4.3 per cent per annum. This growth is in keeping with forecasts of most other jurisdictions in Australia and is consistent with the five year Australian average annual growth rate of 4.4 per cent per annum (Tourism Research Australia, 2015).

There are 8,500 accommodation rooms in the Northern Territory with a current room occupancy rate of 65 per cent. In the Alice Springs tourism region there are nearly 1,500 accommodation rooms (Australian Bureau of Statistics, 2015) with a room occupancy rate of 65 per cent for the year ending June 2015 representing an increase of 3 per cent on the previous year and confirming a two year increase in occupancy rates in the region. Peak occupancy rates in the town tend to be in the months of August, September and October as a result of winter holiday breaks when room occupancy rates reached just under 80 per cent in 2015 (Tourism NT, 2015).

FIGURE 2.4 TOTAL HISTORIC AND PROJECTED VISITOR NIGHT GROWTH: NORTHERN TERRITORY

SOURCE: (TOURISM RESEARCH AUSTRALIA, 2015)

Housing sector

As of the December 2015 quarter, the median house price in the Greater Darwin area was \$585,000 while in Alice Springs it was \$459,500. The Alice Springs housing market experienced strong growth from 2007 to 2011 as a result of increased demand for housing for employees of the Commonwealth Government's Northern Territory Emergency Response otherwise known as the intervention. Since 2011, the growth in median house prices in the town has levelled off and is currently experiencing rates of around 1.0 per cent per annum for houses and units as illustrated in **Figure 2.5**.

FIGURE 2.5 MEDIAN HOUSE AND UNIT PRICES: ALICE SPRINGS

SOURCE: (NT TREASURY, 2015)

In comparison, median house prices in the Greater Darwin area are currently falling after realising strong growth in 2012 and 2013 as illustrated in **Figure 2.6** which shows the median house price in Darwin over time (NT Treasury, 2015). This trend is evident by comparing long term growth rates to current growth rates. Over the decade to 2014, house prices in Darwin rose by an average of 6.0 per cent per annum while they fell by 3.7 per cent in 2014 (Real Estate Institute of the Northern Territory, 2015).

The rental markets in both Alice Springs and Greater Darwin are currently flat with both experiencing falling rents and higher vacancy rates. In June 2015, there was a vacancy rate of around 7 per cent in Alice Springs for all dwellings, mainly as a result of high vacancy rates for units. This is a higher vacancy rate than historical levels which have trended around 4.0 per cent per annum since 2011. In Darwin the vacancy rate for houses and for units is currently 6.9 per cent which continues an upward trend since June 2013 when vacancy rates were around 2.0 per cent (Real Estate Institute of the Northern Territory, 2015).

FIGURE 2.6 MEDIAN HOUSE PRICE AND RENTAL PRICE: GREATER DARWIN



SOURCE: (NT TREASURY, 2015)

2.5.2 Alice Springs region economy

The Alice Springs regional economy is driven by the town of Alice Springs as the major service and supply base for the population of Central Australia and particularly for the surrounding Aboriginal population. It also supports the mining and agricultural industries, the tourism sector, and the Joint Defence Facility at Pine Gap.

There are a range of industries in the town including the government sector, the construction industry, the retail trade industry and the tourism sector. Despite this, the town has a fairly limited economic base that is heavily skewed towards the government sector and the provision of government services in the areas of public administration (police, welfare and so on), education and training, health and the local government sector.

The town holds an annual Alice Springs Mining Services Expo which showcases mining and related industry opportunities in the Alice Springs and Tennant Creek region held in conjunction with the Northern Territory Geological Survey's Annual Geoscience Exploration Seminar.

2.5.3 Local region economy

The economy of the Local region is dominated by the town of Alice Springs which is described in the previous Section.

In the Yuendumu – Anmatjere SA2 area, the economy is very limited. By way of example, there are less than 500 people employed in the area of which 62 per cent of people are employed in Government related industries including the Local Government sector. The agricultural industry comprises of the pastoral industry as well as horticulture developments, primarily located in Ti Tree. It is a major employer for people in this area accounting for around 40 people or 8 per cent of the workforce.

Approximately 44 people or 9 per cent of the workforce are employed in the retail trade industry which includes local grocery and provisions stores. There are very few people from Yuendumu – Anmatjere SA2 area that are employed in the mining and related industries. As of the 2011 Census there were four people recorded as employed in the mining industry and three in the construction industry.

2.6 Workforce

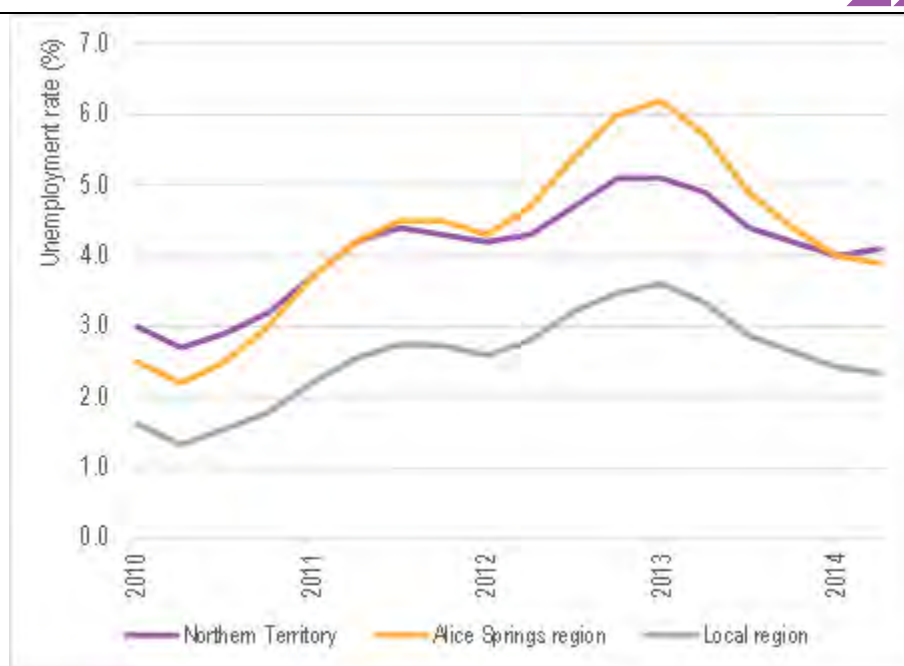
The following sections profile the workforce of the Northern Territory, the Alice Springs region and the Local region in terms of the size of the workforce, the number of employed people, the unemployment rate, and the industry in which the workforce is employed along with their occupation and income. Finally, an indication of the level of skills in these areas is presented.

2.6.1 Workforce size and employment

The Northern Territory has a large workforce of nearly 122,000 people of whom around 5,000 are currently seeking work. This equates to an unemployment rate in the Northern Territory of around 4.1 per cent in 2014-15 where the unemployment rate is defined as the number of people seeking work as a percentage of the workforce, as reported by the Department of Employment (Department of Employment, 2015).

The Alice Springs region supports a workforce of around 29,000 people of whom just over 1,100 are currently seeking work. This equates to around 24 per cent of the workforce of the Northern Territory and 23 per cent of all job seekers in the Territory. The current unemployment rate of the Alice Springs region is comparable with that of the Territory at 3.9 per cent however unemployment rates are more variable in the Alice Springs region as illustrated in **Figure 2.7** which shows historical unemployment.

The Local region has a workforce of just over 20,000 people with a current unemployment rate of just 2.8 per cent. This represents around 575 people seeking work with most of these job seekers located in the Alice Springs Local Government Area. The workforce of the Local region is dominated by the Alice Springs Local Government Area which has a workforce of just under 19,500 workers and an unemployment rate of 1.7 per cent. This would indicate that just over 650 people in the area outside of Alice Springs are employed of which almost 200 are seeking work representing an unemployment rate of nearly 22 per cent in this area. This higher unemployment rate is reflective of the limited job opportunities in these areas and the difficulties that job seekers face in securing employment. Furthermore, it is likely that there are other people from the area that are not currently seeking work due to the low expectation of gaining employment resulting in an unemployment rate that is not reflective of the actual number of job seekers in the area.

FIGURE 2.7 UNEMPLOYMENT RATE: NORTHERN TERRITORY, ALICE SPRINGS REGION AND LOCAL REGION

SOURCE: DEPARTMENT OF EMPLOYMENT. NOTE: PEOPLE AGED 15 TO 65

The Department of Employment reports job seeker information at the Alice Springs region and Northern Territory level. The average age of a job seeker in the Alice Springs region is 35 years old and the average time seeking work is 31 months. The average age of a job seeker in the Northern Territory is also 35 years and the average time seeking work is slightly less at 26 months. The Australian averages are 37 years and 27 months respectively. This would suggest that it is more difficult for job seekers in the Alice Springs region to find employment.

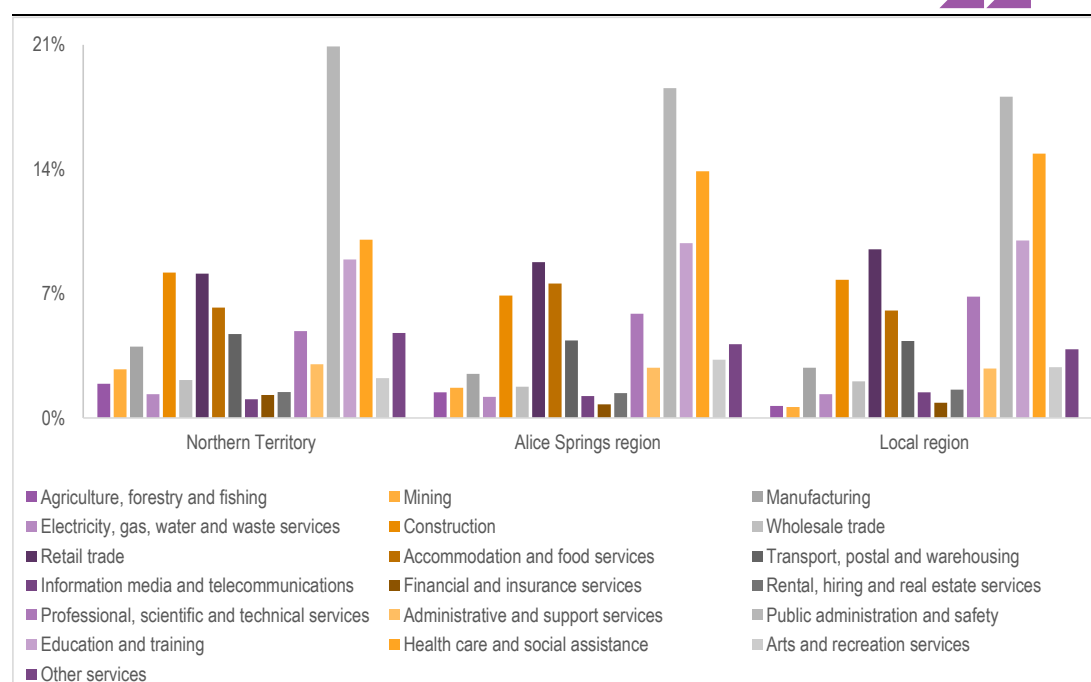
2.6.2 Industry of employment

The dominance of the government sector as a major employer in the Northern Territory is highlighted in **Figure 2.8** which shows the industry of employment for employed residents of the Northern Territory, the Alice Springs region and the Local region. Forty per cent ($n = 32,375$ workers) of the employees in the Northern Territory are employed in the industries of Public administration and safety, Education and training and Health care and social assistance which largely reflect the industries that comprise the government sector including services provided by Local, Territory and Federal governments. In comparison, 42 per cent ($n = 5,045$) of the Alice Springs region and 43 per cent ($n = 4,221$) of the Local region are employed in this sector. The Local region is dominated by the workforce of Alice Springs. In the areas outside of the town of Alice Springs, the reliance on the government sector as the major employer is even more pronounced with 62 per cent ($n=295$) of the working population employed in this sector.

The three main industries of employment in the Northern Territory are the Public administration and safety industry with 21 per cent of total employment, the Health care and social assistance industry (10%) and the Construction industry with 8.2 per cent of total employment. The three main industries of employment in the Alice Springs region and the Local region are the government related industries of Public administration and safety, Education and training and Health care and social assistance.

In the areas outside of the town of Alice Springs in the Local region, the main industries of employment are the Public administration and safety, Education and training, and Retail trade industries.

FIGURE 2.8 INDUSTRY OF EMPLOYMENT: NORTHERN TERRITORY, ALICE SPRINGS REGION AND LOCAL REGION (% OF TOTAL EMPLOYED PERSONS AGED 15+)



SOURCE: AUSTRALIAN BUREAU OF STATISTICS 2011 CENSUS DATA BY PLACE OF USUAL RESIDENCE. EMPLOYED PERSONS AGED 15 AND OVER

2.6.3 Occupation

The occupation of employed persons aged 15 and over in the Northern Territory is presented in **Figure.2.9**. The Figure shows that there is a high number of Professional in the Northern Territory as well as in the Alice Springs region and the Local region. The Local region is very similar to the Alice Springs region as most of the workers from the Local region work in the town of Alice Springs. The occupation profile therefore has a very high number of Professional and Community and personal service workers reflecting the nature of the town of Alice Springs as a government service sector. It also has a very high number of Technicians and trades workers who are most likely employed in the Construction industry which employs 7.8 per cent of employed persons and after the Retail trade industry, is the second largest non-government industry of employment in the Local region.

In comparison, the occupation profile of the Northern Territory shows a more even spread of employed people across occupations.

FIGURE.2.9 OCCUPATION: NORTHERN TERRITORY, ALICE SPRINGS REGION AND LOCAL REGION (% OF EMPLOYED PERSONS AGED 15+)

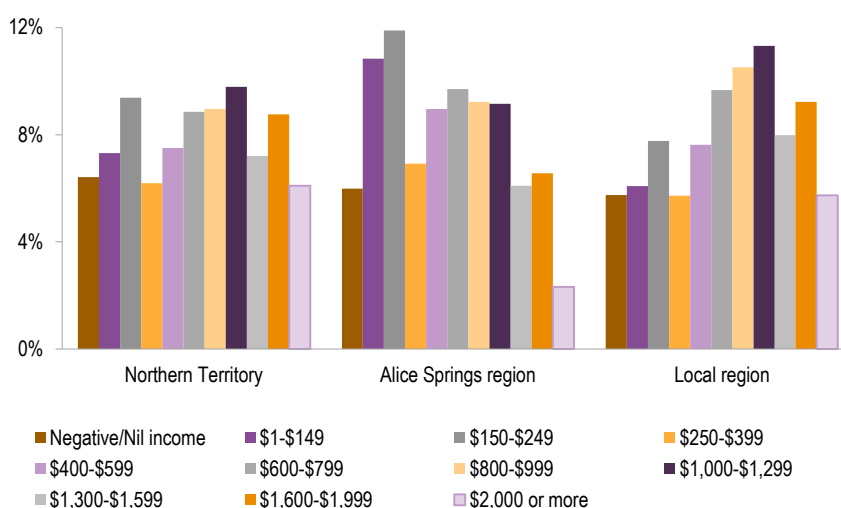


SOURCE: AUSTRALIAN BUREAU OF STATISTICS 2011 CENSUS DATA BY PLACE OF USUAL RESIDENCE. EMPLOYED PERSONS AGED 15 AND OVER

2.6.4 Income

Incomes in the Alice Springs region are very low as illustrated in **Figure.2.10** which shows personal weekly income for persons aged 15 and over in the Northern Territory, the Alice Springs region and the Local region.

FIGURE.2.10 PERSONAL WEEKLY INCOME: NORTHERN TERRITORY, ALICE SPRINGS REGION AND LOCAL REGION (% OF TOTAL PERSONS AGED 15+)



SOURCE: AUSTRALIAN BUREAU OF STATISTICS 2011 CENSUS DATA BY PLACE OF USUAL RESIDENCE. PERSONS AGED 15 AND OVER

The 2011 Census recorded 32 per cent of the population in the Northern Territory earning in excess of \$1,000 per week and 6 per cent of the population earn in excess of \$2,000 per week. In comparison, 24 per cent of the population of the Alice Springs region earned in excess of \$1,000 per week and only 2 per cent earned in excess of \$2,000 per week.

Incomes in the Local region are comparatively high with 34 per cent of the population earning in excess of \$1,000 per week and 6 per cent earning in excess of \$2,000 per week. This is equivalent to 14 per cent of all of the people in the Northern Territory in this wage bracket. These higher earnings is

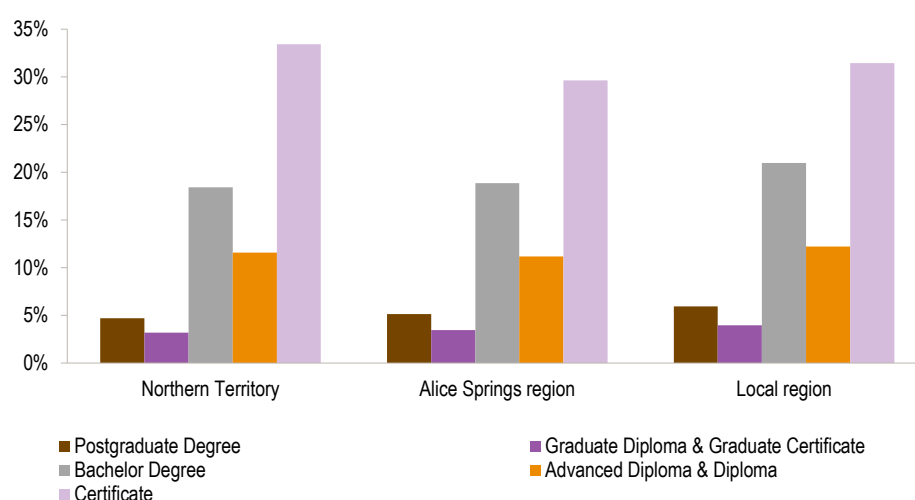
because the area includes the town of Alice Springs in which there are a high number of tertiary qualified people and people working in Professional occupations who tend to earn higher incomes, as well as other higher income earners.

2.6.5 Skills level

Fifty seven per cent of people aged 15 and over in the Northern Territory hold a non-school qualification compared to 56 per cent of the Alice Springs region and 59 per cent of the Local region.

Figure.2.11 shows the non-school qualifications of people aged 15 and over who hold a qualification and who live in the Northern Territory, compared to those that live in the Alice Springs region and the Local region as of the 2011 Census. The Figure shows that in all regions, the most commonly held qualification is a Certificate. It also shows that as a share of the total number of qualified people, the level of qualifications are higher in the Local region than in the Northern Territory and the Alice Springs region.

FIGURE.2.11 NON SCHOOL QUALIFICATION NORTHERN TERRITORY, ALICE SPRINGS REGION AND LOCAL REGION (% OF TOTAL PERSONS WITH A QUALIFICATION AGED 15+)



SOURCE: AUSTRALIAN BUREAU OF STATISTICS 2011 CENSUS DATA BY PLACE OF USUAL RESIDENCE. PERSONS WITH A QUALIFICATION AGED 15 AND OVER

In the Local region, 31 per cent of qualified people hold a Bachelor degree or higher (Postgraduate Degree, Graduate Diploma and Graduate Certificate, and Bachelor Degree) while the equivalent for the Northern Territory is 26 per cent and the Alice Springs region is 27 per cent. The higher qualifications in the Local region are a result of the occupation profile in the town of Alice Springs which supports a large number of government workers and other tertiary qualified people. In the areas outside of the town of Alice Springs, only 19 per cent of the population with a qualification hold the same level of qualifications.

In terms of absolute numbers, the number of qualified people in the Local region with a Bachelor or higher degree is 3,839 people which is 16 per cent of all the people in the Northern Territory with these qualifications. In the Alice Springs region this equivalent is 4,264 people or 18 per cent of the Northern Territory total.

2.7 Summary

The area surrounding the proposed Nolans Project is characterised by a relatively large and sparsely populated area supporting a considerable Indigenous population. In the immediate area of the Project, 86 per cent of the population is Indigenous. The closest towns to the proposed development are the small communities of Laramba, Ti Tree and Alyuen. The nearest major population centre is the town of Alice Springs which is a modern town of some 28,667 persons comprising 12 per cent of the population of the Northern Territory. The town is a service centre for the Local region and as such

supports a modern and diverse range of businesses that cater for the local population and an economy built on government services, mining, tourism and the pastoral industry. Population growth in the town is slow and is forecast to remain depressed. Rental vacancies for houses and particularly dwellings in the town are growing and housing prices are falling.

The workforce of the Local region is dominated by the town of Alice Springs and therefore shows a highly educated and well paid workforce with a large number of people employed in professional and government occupations. However, the region also supports a large number of people employed as labourers most likely employed in the local construction industry. In the areas outside of the town of Alice Springs, the population is scattered and comprises mainly of Aboriginal communities. The economy is very limited in these areas and there are few employment opportunities. There are just under 650 people who are employed with around two thirds of these employed in Government Services related industries and only 7 people employed in mining and construction. There are almost 200 people seeking work from the Yuendumu – Anmatjere SA2 area representing an unemployment rate in this area of almost 22 per cent which is in stark contrast to the unemployment rate in the Local region.

3

ECONOMIC
IMPACT
ASSESSMENT

The construction and operation of the Nolans Project will create an economic impact on the surrounding Alice Springs region, the Northern Territory and Australia as a result of the spending on goods, services and wages associated with the Project. This spending will create a direct impact in terms of its initial impact as well as an indirect impact as a result of the additional spending that becomes possible because of the direct spending by the Project. This Chapter outlines the direct and indirect economic impact of the Nolans Project over the life of the Project. The structure of the Chapter is based on the NT EPA Guidelines requirements (Northern Territory Environmental Protection Authority, 2015).

3.1 Major Project assumptions

The Nolans Project is expected to take around three years to construct with peak construction occurring in the second year. Over the construction period, it is expected that 375 full time equivalent workers will be employed. At peak construction there will be a full time equivalent workforce of around 200 workers as illustrated in **Table 3.1** which shows the major Project assumptions for the Nolans Project.

The operational life of the Project is expected to be in excess of 40 years with steady state production expected to be achieved around 2022 or within three years of operation. At steady state production, the mine is expected to employ 248 full time equivalent workers.

TABLE 3.1 MAJOR PROJECT ASSUMPTIONS: NOLANS PROJECT

Item	Assumption
Construction period	Three years (36 months)
Peak construction	Year two
Construction workforce	375 FTE
Peak construction workforce	200 FTE
Operational life	40 years
Steady state production	2022
Steady state production workforce	248 FTE

SOURCE: ARAFURA RESOURCES. NOTE: FTE = FULL TIME EQUIVALENT JOB

3.2 Project financial assumptions

The key Project financial assumptions for the Nolans Project are presented in **Table 3.2**. It is estimated that the Nolans Project will involve capital expenditure in Australia and overseas of around \$1.19 billion over a three year period from 2017 to 2019. First production is expected in 2020 with

steady state production reached around 2022. At steady state, the Project will produce around 20,000 tonnes per annum of rare earths products earning revenue of around \$520 million per annum.

Total operations expenditure at the Nolans Project site in the Northern Territory during steady state production will be around \$188 million per annum as illustrated in **Figure 3.1** which shows the expenditure profile of the Project in the construction and operation phases.

TABLE 3.2 PROJECT FINANCIAL ASSUMPTIONS: NOLANS PROJECT

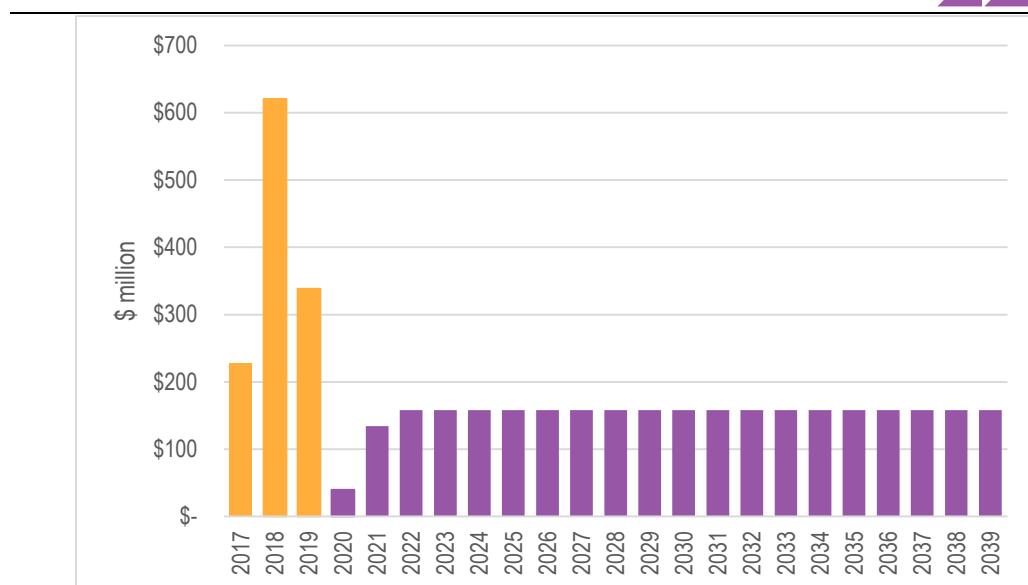
Item	Assumption	
Capital expenditure (Australia and overseas sites)	\$1.19 billion	
Operations expenditure (Australian site only)	\$188 million per annum at steady state	
Revenue	\$520 million per annum at steady state	
Local content assumptions (construction expenditure)	Local (Alice Springs SA3)	6%
	NT	12%
	Australia	73%
	Overseas	27%
Local content assumptions (operation expenditure)	Local (Alice Springs SA3)	10%
	NT	21%
	Australia	48%
	Overseas	52%
Tax and royalty payments (directly paid by Project)	\$155.3 million per annum at steady state	
Any value adding that will occur in the NT	\$520 million per annum at steady state	
Value of exports	\$520 million per annum at steady state	

SOURCE: ARAFURA RESOURCES

In construction, the Nolans Project will have a high local content with an estimated 73 per cent of all construction costs to be spent in Australia. These costs will primarily be associated with the costs to install the concentrator plant, the intermediate plant and the associated infrastructure. Australian businesses will also be involved in the areas of earthworks, road works, construction, transport and logistics, preparing the mine site for mining by removing overburden, and so on.

Arafura has estimated a local content in the Northern Territory during construction of 12 per cent including a 6 per cent spend in the Alice Springs region.

Expenditure of around \$188 million per annum will be required to operate the Nolans Project (Australian operations only), of which 48 per cent or nearly \$91 million per annum will be spent on goods and services in Australia. Around 21 per cent of the total operations expenditure will be spent in the Northern Territory including 10 per cent in the local Alice Springs region.

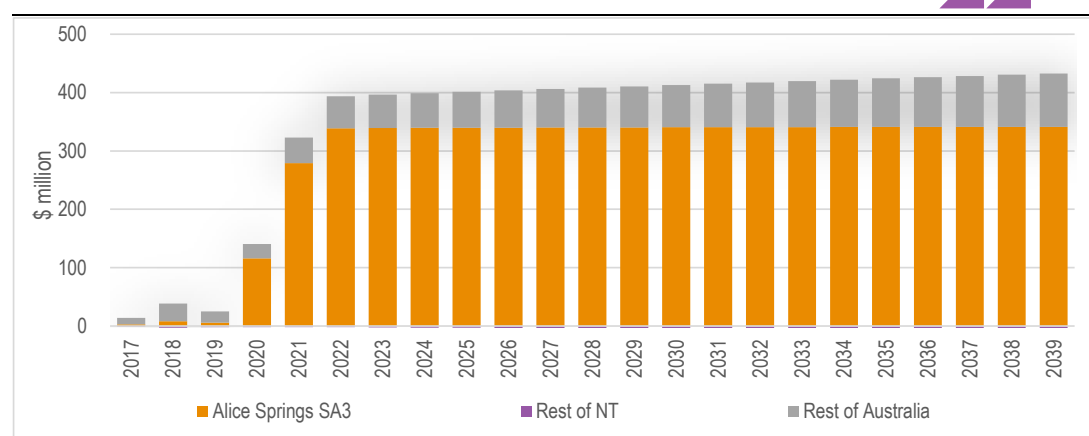
FIGURE 3.1 NOLANS PROJECT CAPITAL AND OPERATIONAL EXPENDITURE

SOURCE: ARAFURA RESOURCES

3.3 Contribution to Gross Product

The expenditure in the construction and operation of the Nolans Project will generate a stimulus to the Gross Product of the region, the Northern Territory and Australia in the form of the direct expenditure on the Project and the indirect stimulus to expenditure that this creates. This contribution has been estimated using a General Equilibrium Model incorporated with Project data supplied by Arafura. Details of the model and its assumptions are presented in Appendix A.

Figure 3.2 shows the impacts of the Nolans Project on Gross Product during construction and operation. The Figure shows that the impacts in the construction phase are relatively small, however they rise considerably as the Project comes into operation. This is because the changes to the economy are projected to occur broadly in line with the value of production. In the operations phase, the key benefits of the Project will be realised through the monetisation of otherwise unutilised resources and additional factors of production.

FIGURE 3.2 CONTRIBUTION TO GROSS PRODUCT: NOLANS PROJECT

SOURCE: ACIL ALLEN ECONOMIC MODELLING

Table 3.3 shows a summary of the projected cumulative change in real economic output or Gross Product, and real income as a result of the Nolans Project under various net present value discount rates.

TABLE 3.3 PROJECTED CUMULATIVE CHANGE IN REAL ECONOMIC OUTPUT AND REAL INCOME: NOLANS PROJECT

	Real economic output			Real income		
	Total (2017 to 2039)	Net present value		Total (2017 to 2039)	Net present value	
		4%	7%		4%	7%
	2016 A\$m	2016 A\$m	2016 A\$m	2016 A\$m	2016 A\$m	2016 A\$m
Alice Springs SA3	6,540	3,885	2,742	282	182	138
Rest of NT	-107	-60	-41	435	255	177
Rest of Australia	1,449	852	601	9,922	5,927	4,208
Total NT	6,433	3,825	2,701	717	437	315
Australia	7,882	4,677	3,302	10,639	6,364	4,522

SOURCE: ACIL ALLEN ECONOMIC MODELLING

Each of the following sections describe the impact of the Nolans Project on Gross Product over the life of the project, in the construction phase and during operations.

3.3.1 Life of the Project

This additional spending in the economy will contribute significantly to the Gross State Product of the Northern Territory. Over the life of the Project, including the construction period, the Nolans Project will generate \$6.4 billion or an average \$280 million each year to the Gross State Product of the Northern Territory. This is a significant **annual** contribution to the Gross State Product of the Northern Territory and is equivalent to 1.3 per cent of the current Gross Territory Product of \$21.9 billion.

Nearly all of the impacts from the Project will be realised in the Alice Springs region as illustrated in **Figure 3.2** which shows the contribution to the Gross Product of the Alice Springs region, the rest of the Northern Territory and the rest of Australia (excluding the Northern Territory). This is because the production of the Nolans Project occurs in the Alice Springs region. Over the life of the Project, the Nolans Project will generate \$6.5 billion or an average of \$284 million each year to the Gross Regional Product of the Alice Springs region. The reason that this impact is larger than the contribution to the Gross State Product of the Northern Territory is that the Project will draw resources away from the rest of the Northern Territory.

In total over the life of the Project, the Gross Domestic Product of Australia will rise by nearly \$7.9 billion, and average of \$342 million each year.

3.3.2 Construction phase

It is estimated that over the three years of construction, there will be capital expenditure of \$1.19 billion on the Nolans Project of which around \$866 million will be spent in Australia. Of this, nearly \$145 million will be spent in the Northern Territory including \$71 million in the Alice Springs region. In steady state operations, there will be expenditure of \$90.6 million per annum in Australia including over \$38 million in the Northern Territory and \$18 million in the Alice Springs region.

This expenditure will result in a boost to the Gross Domestic Product of Australia of nearly \$72 million over the construction period or an average of around \$24 million per annum for the three years of construction. The Gross State Product of the Northern Territory will rise by nearly \$11 million or over \$3.6 million in each year of construction. The impact on the Alice Springs region will be even higher with Gross Regional Product rising by nearly \$17 million or \$5.6 million per annum. The impact in the region is higher as it draws resources away from the rest of the Northern Territory.

3.3.3 Operating phase

ACIL Allen modelled 20 years of operation of the Nolans Project including the two year ramp up phase. Steady state operations is expected to be achieved in 2022 when an estimated \$188 million each year will be required to operate the Australian operations of the Nolans Project. This additional spending in the economy will boost the the Gross Domestic Product of Australia by an average of \$390 million per year in operation over 20 years of operation. Nearly all of the impacts from the Nolans Project in operation in terms of the contribution to Gross Product will be realised in the Alice Springs region because this is where the Project is located.

While there will be an average increase of \$321 million per annum in the Gross State Product of the Northern Territory as a result of the Nolans Project, the Gross Regional Product of the Alice Springs region will rise by a slightly higher amount averaging \$326 million per annum over the modelled 20 year operating life of the Project.

3.3.4 Real incomes

Another measure of the contribution to the economy, is the contribution to real incomes. Real income is a measure of the ability to purchase goods and services, adjusted for inflation. A rise in real income indicates a rise in the capacity for current consumption, but also an increased ability to accumulate wealth in the form of financial and other assets. The change in real income from a development is a measure of the change in welfare of an economy.

The extent to which the local residents will benefit from the additional economic output depends on the level of ownership of the capital (including the natural resources) utilised in the business as well as any wealth transfers undertaken by Australian governments as a result of the taxation revenues generated by the Nolans Project.

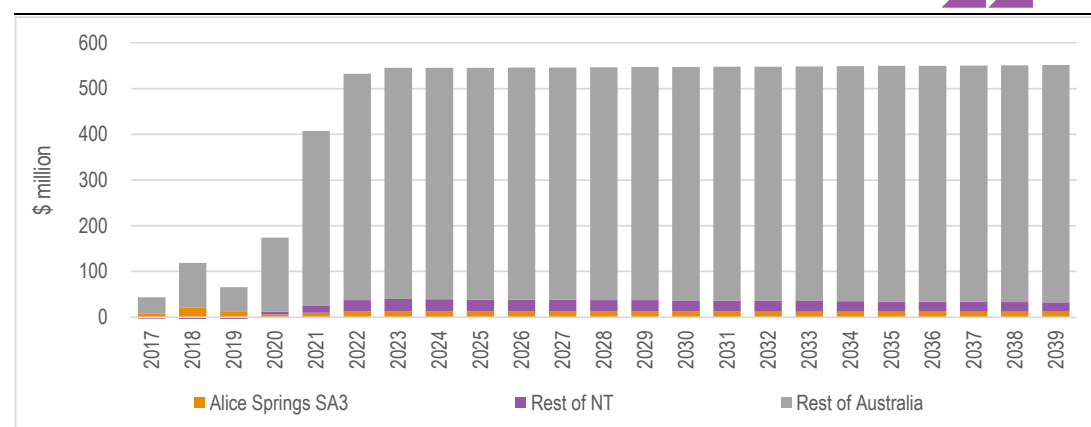
Given the low population currently living in the Alice Springs region, the assumed proportion of the potential employees for the Project will live in the local area will provide a significant boost to the local incomes. However, as only a small portion of the Project is assumed to be owned by local residents, a significant portion of the wealth generated by the economic activity is transferred outside of the Alice Springs region primarily to Australian shareholders which have been assumed to be evenly disbursed across Australia.

In addition, the Northern Territory Government will receive additional royalties and taxes from the Project and the Australian Government will also receive additional taxation which will be spent to the benefit of Australian residents. It is assumed for this modelling that the government revenue paid to the Northern Territory Government will be spent proportionately to the population in each region of the Territory. Similarly, taxes paid to the Australian Government have been assumed to be spent in each Australian region proportionate to their population.

Consequently, most of the real income benefit associated with the Project, in absolute terms rather than in per capita terms, is projected to accrue to residents outside of the local region as illustrated in **Figure 3.3**. Over the life of the Project, the Nolans Project will contribute \$10.6 billion to the real

incomes of Australians. This includes an increase of \$717 million to real incomes in the Northern Territory and \$282 million in real incomes in the Alice Springs region.

FIGURE 3.3 CONTRIBUTION TO REAL INCOMES: NOLANS PROJECT



SOURCE: ACIL ALLEN ECONOMIC MODELLING

3.4 Contribution to government revenue

The construction and operation phases of the proposed Nolans Project will generate a number of Federal, Territory and Local Government revenues. Federal Government revenue will be realised through such taxes as Company taxation, Income taxation and GST payments.

Government revenues will rise significantly as a result of the Project. The Northern Territory Government will receive revenue from additional taxes including minerals royalties, Payroll taxation, and Stamp Duties. Local Government in the vicinity of the Project may receive revenue through an increase in rates revenue from any additional housing, as well as from other taxes and charges.

The direct taxation payments as a result of the Nolans Project have been estimated by Arafura in terms of Australian Company taxation for its domestic and overseas operations, Payroll taxation and Royalties are presented in **Figure 3.4**.

3.4.1 Payroll taxation

Payroll taxation is a general purpose tax that is currently levied by the Northern Territory Government at rate of 5.5 per cent of the total wages paid by an employer in the Northern Territory where the annual threshold before it becomes payable is \$1,500,000.

In construction, the Nolans Project is estimated by Arafura to pay over \$49 million in wages in the three years of construction. At steady state operations, the Nolans Project will pay just over \$33 million per annum in wages in Australia.

Assuming no deductions, these payments will result in estimated Payroll taxation payments to the Northern Territory Government by Arafura in the order of \$2.7 million over the construction period or an average of just over \$900,000 in each year of the three years of construction. In steady state operation, Arafura has estimated Payroll taxation payments to the Northern Territory Government of just over \$650,000 per annum. Over the life of the Project, this is equivalent to \$15.5 million in Payroll taxation.

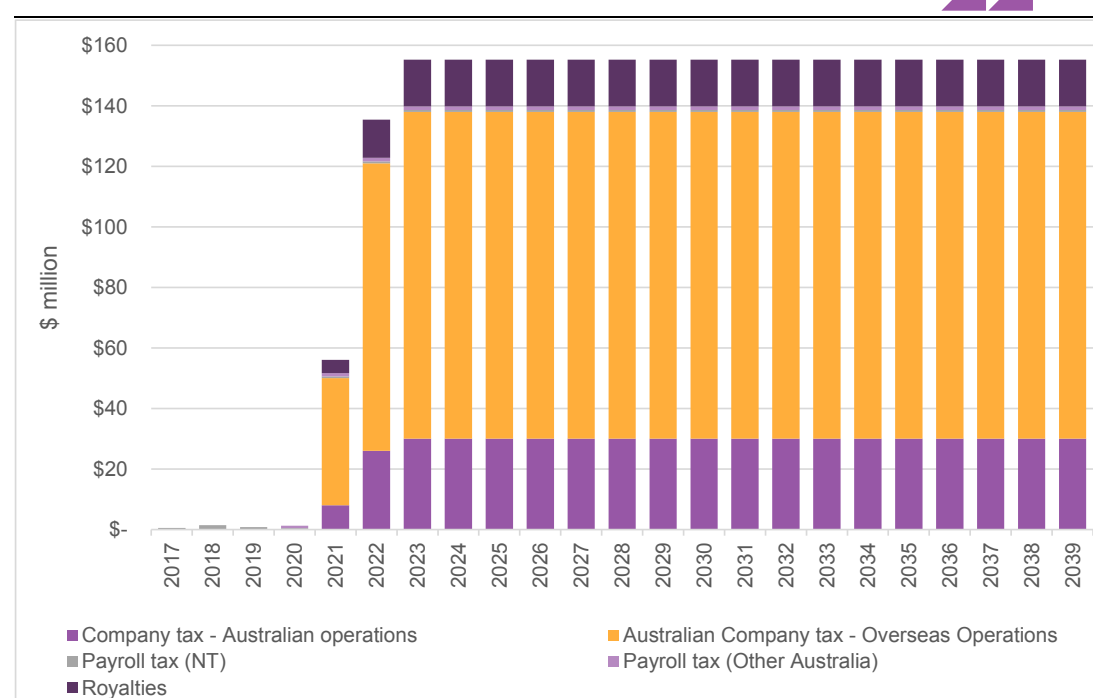
3.4.2 Minerals royalties

Under the Mineral Royalty Act, the Northern Territory Government imposes a minerals royalty on all commodities except for uranium, petroleum and extractive minerals of a specified kind.

Calculation of the value of the royalty payable to Government relies on a formula that is dependent on profitability, allowable deductions on capital assets expenditure and eligible exploration expenditure.

Arafura has estimated these payments to be around \$15.4 million per annum in steady state operations or nearly \$280 million over the life of the Project.

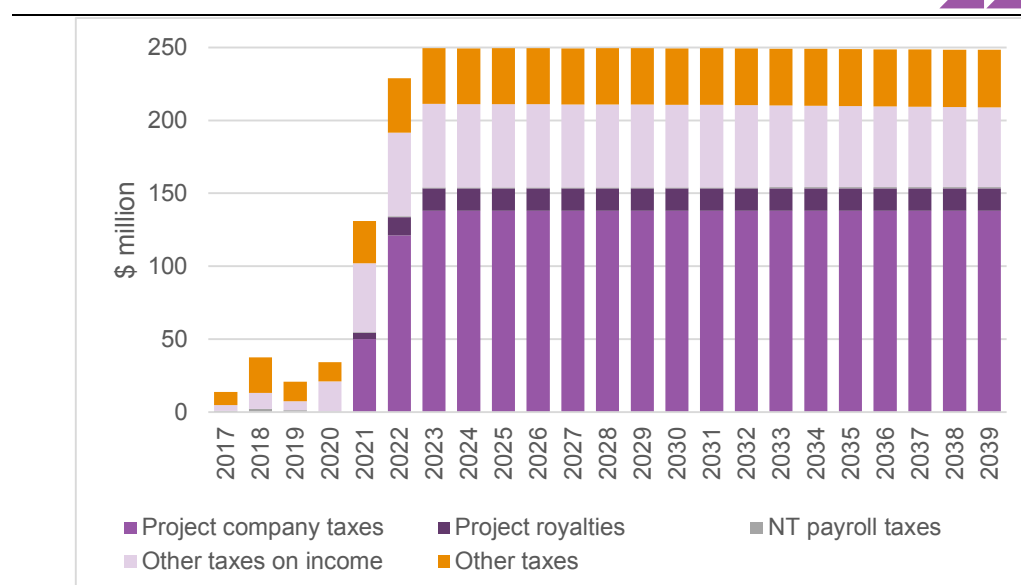
FIGURE 3.4 ESTIMATED DIRECT TAXATION PAYMENTS: NOLANS PROJECT



SOURCE: ARAFURA

3.4.3 Total taxation creation

As well as direct taxation, the Project will also generate indirect taxation. Direct and indirect taxation has been estimated using Computable General Equilibrium modelling. The results of this analysis are presented in **Figure 3.5** which shows the different streams of taxation that are expected to be generated by the Project over time. The Figure shows that the majority of taxation is a result of federal taxation in the form of Company taxation paid by Arafura Resources and other personal and company income taxes paid to the Federal Government paid by the flow on activity generated by the Project. It also shows that the majority of the taxation generated by the Project is a result of indirect taxation. On average, over the life of the Project, the Nolans Project will generate around \$249 million each year in direct and indirect government revenue.

FIGURE 3.5 ESTIMATED DIRECT AND INDIRECT TAXATION PAYMENTS: NOLANS PROJECT

SOURCE: ACIL ALLEN ECONOMIC MODELLING

Table 3.4 shows the total taxation over the life of the Project under various discount rates including the construction and operation phases. The Table shows that over the life of the Project, it is expected to pay \$4.7 billion in direct and indirect taxation. The majority of this taxation is in the form of company taxes paid by Arafura on its Australian and overseas operations as well as other personal and company income taxes paid to the Federal Government. Together these taxes are expected to generate \$3.6 billion over the life of the Nolans Project.

In total, the Northern Territory is likely to receive \$296 million in royalties and payroll taxes as a result of the Nolans Project, or an average of \$16 million per annum in steady state operations.

TABLE 3.4 CUMULATIVE PROJECTED CHANGE IN REAL GOVERNMENT TAX REVENUES, RELATIVE TO THE REFERENCE CASE

	Total (2017 – 2039)	Net Present Value 4%	Net Present Value 7%
Project company taxes	\$2,517	\$1,464	\$948
Project royalties	\$279	\$162	\$105
NT payroll taxes	\$17	\$12	\$8
Other taxes on income	\$1,101	\$663	\$442
Other taxes	\$786	\$480	\$325
TOTAL	\$4,701	\$2,780	\$1,828

SOURCE: ACIL ALLEN ECONOMIC MODELLING. DIRECT TAXATION SUPPLIED BY ARAFURA RESOURCES

3.5 Job creation

The Nolans Project will create direct and indirect employment. Direct employment is the number of workers directly employed on the Project. Indirect employment is the number of workers employed as a result of the additional expenditure in the economy from the Project which generates additional jobs.

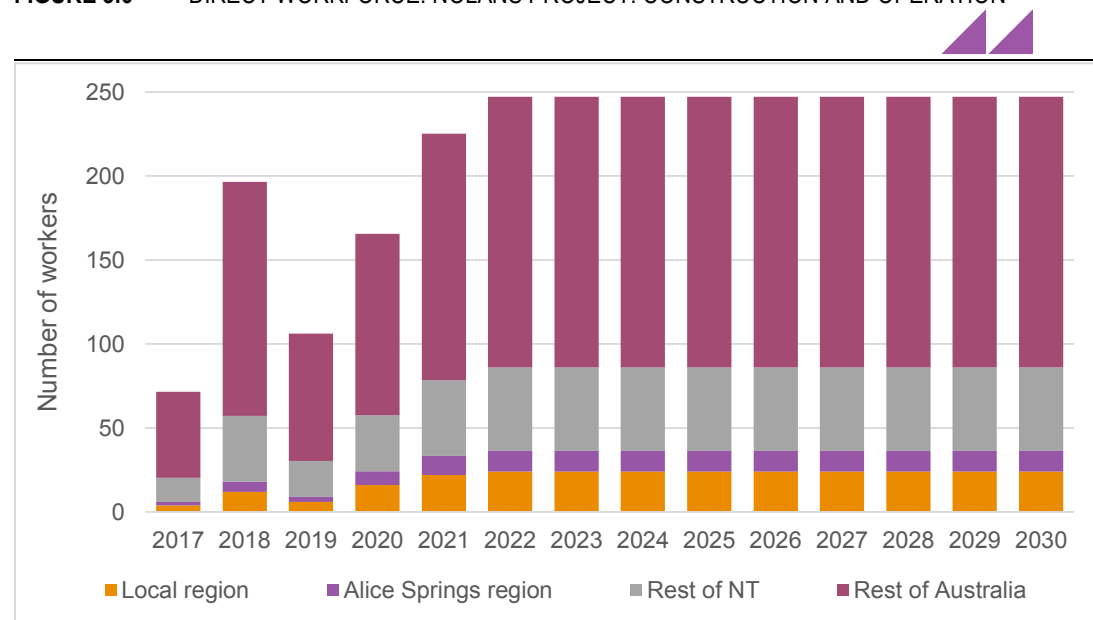
3.5.1 Direct employment

The Nolans Project is expected to create direct employment of 375 full time equivalent workers over the three year construction period from 2017 to 2020 as illustrated in **Figure 3.6** which shows where workers will be sourced from by year. The peak construction workforce will occur in 2018 when a full

time equivalent workforce of nearly 200 workers will be employed. At peak employment, it is expected that 12 of these workers will be sourced from the Local region and another 6 will be sourced from the rest of the Alice Springs region. The remaining 180 peak construction workforce will be sourced from the rest of the Northern Territory or Australia.

In steady state operation, the Project will employ 248 workers. Nearly 40 of these jobs will be sourced from the surrounding area including 24 from the local area and another 12 from the Alice Springs region. In total, it is expected that nearly 90 workers on the Project will be sourced from the Northern Territory and the remaining 160 will be sourced from Australia.

FIGURE 3.6 DIRECT WORKFORCE: NOLANS PROJECT: CONSTRUCTION AND OPERATION



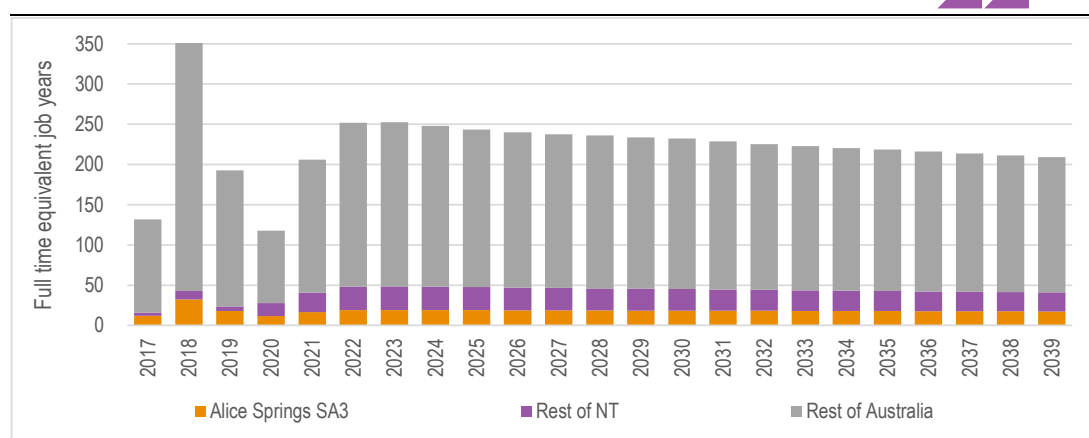
SOURCE: ARAFURA RESOURCES

3.5.2 Indirect employment

As well as direct employment, the Project will create indirect employment measured in full time equivalent years. The impact on employment creation has been estimated using Computable General Equilibrium modelling. This analysis found that the construction of the Nolans Project is expected to result in the creation of 675 full time equivalent job years in the three years of construction. On average this equates to 225 full time equivalent job years in each year of construction.

Over the life of the Project, the Nolans Project will create around 4,185 full time equivalent job years in Australia, an average of 223 full time equivalent job years per annum. Most of the job creation will occur in the rest of Australia. This is because of the redistribution of profits and taxes from the Project are expected to flow to the rest of Australia. In addition, the Project assumes that a high proportion of the workforce will be sourced from the rest of Australia including 65 per cent in steady state operations.

Figure 3.7 shows the employment net direct and indirect employment creation from the Nolans Project. It shows that the biggest impact from the Project will occur in the peak construction year. It also shows that the Project will deliver long term job creation in Australia particularly in the rest of Australia where most of the job creation will be realised. There will be significant impacts in the Alice Springs region where an estimated 420 full time equivalent job years will be created over the life of the Project. This is equivalent to an average of 18 full time equivalent job years per annum or 1.6 per cent of the current number of unemployed people in the Alice Springs region.

FIGURE 3.7 EMPLOYMENT CREATION: NOLANS PROJECT: CONSTRUCTION AND OPERATION

SOURCE: ACIL ALLEN ECONOMIC MODELLING

3.6 Contribution to regional development

The contribution of the Nolans Project to regional development is significant and includes:

- Community benefit arrangements proposed by Arafura that will assist the Local region and the Alice Springs region in terms of skills development, sponsorships and so on
- Regional economic benefits created as a result of the Project in the form of additional spending, new business and employment opportunities, attracting new population to the area, improving the wealth of individuals in the region and so on
- Residual infrastructure, such as roads, camps, and power facilities that will be constructed for the Project and which Arafura will allow local people and industry to utilise.

3.6.1 Community benefit arrangements

Arafura Resources is currently negotiating a community benefits package. This package is likely to include some form of compensation to the local community in the form of the contributions to community infrastructure.

Arafura will make commitments to local employment through local employment targets. There will also be local sponsorships for community based events and programs that target the whole community. These will include those that provide education and training, health benefits, community development, and economic development opportunities for the community as a whole.

3.6.2 Regional economic benefits

Regional economic benefits as a result of the Nolans Project have been estimated using Computable General Equilibrium modelling where the region has been defined as the area comprising the Yuendumu – Anmatjere SA2 area and the Alice Springs Local Government Area as per the statistical boundaries defined by the Australian Bureau of Statistics. These benefits are the increase in the economic value in the region created by the Project.

The economic benefits to the Alice Springs region are substantial with 83 per cent of the total impact on Gross Product from the Nolans Project accruing to the region. Economic modelling found the contribution to the regional area during construction to be \$17 million over the three year construction period. This is equivalent to an average of \$5.6 million per annum. In steady state operations the impact is expected to be much larger and in the order of an average of \$326 million per annum over the modelled period of 20 years. Over the life of the Project, an estimated \$6.5 billion will be added to the Gross Product of the Alice Springs region, an average of \$284 million per annum. This is a significant amount in an area which has a limited economy based primarily on the delivery of Government Services to the surrounding population.

There are also a number of other regional benefits from the Nolans Project including but not limited to job creation, the development of the region as a resources region, the boost to the local business sector, regional population growth and an increase in demand for services provided by the tourism sector. These benefits are described in greater detail in the following sections.

Employment creation

In terms of direct and indirect job creation, the Project is expected to create 675 full time equivalent job years over the three years of construction (2017 to 2019) of which 352 job years will be created in the peak construction period in 2018. In the Alice Springs region, the Nolans Project will create 62 full time equivalent job years over the three years of construction of which 32 job years will be created in the peak construction period.

In steady state operation, the Project is expected to generate an average of 223 full time equivalent job years in each year of operation. Eighteen of these job years will be created in the Alice Springs region.

In addition to boosting Gross Regional Product and employment in the Alice Springs region, the Project will also generate taxation revenue and royalty payments of which some will flow back into the region through the redistribution of Goods and Services Taxation (GST) revenue and spending by the Territory and Commonwealth governments on infrastructure, services and other programs.

Real incomes

In the Northern Territory, real incomes are expected to rise by an estimated \$717 million over the life of the Project including by \$282 million in the Alice Springs region. This means that the ability of residents of the Alice Springs region to purchase goods and services and to accumulate wealth will rise by an average of \$12 million per annum over the life of the Project.

Resources industry

There will be economic benefits to the region in terms of the development of the area as a resources region. There are already three mines operating within approximately 500 km of the town of Alice Springs. These include the Tanami gold mine located around 540 km north west of Alice Springs, the small Twin Bonanza gold mine located around 500 km due west of the Nolans Project and the recently constructed Spinifex Bore garnet sand surface mining and processing operation. Note however that the Twin Bonanza gold mine is expected to cease operation in April 2016. There are four proposed projects within 500 km of Alice Springs which could all come into operation by 2021 (Northern Territory Environmental Protection Authority, 2015). These include the Mt Peake Project - stage 1, the Jervois Mine redevelopment, the Chandler salt mine and the Tanami gold mine expansion.

The construction of the Nolans Project will result in four operating mines in the region and the potential for eight operating mines if all proposed mines come into operation. Its development may assist in attracting new and/or expanded businesses to service the resources industry in the region by providing the critical mass or opportunity for businesses to service a number of resources companies. The town of Alice Springs actively encourages the development of the industry through the annual Alice Springs Mining Services Expo which showcases mining and related industry opportunities in the Alice Springs and Tennant Creek region.

Businesses

The Nolans Project will provide additional demand for existing goods and services in the region from the direct expenditure by the Project and the indirect expenditure as a result of the increased wealth in the region. Arafura has estimated that the Nolans Project will include expenditure in the Alice Springs region of \$71 million in construction and \$18 million per annum in steady state operations. Economic modelling found that the Nolans Project will contribute an average of \$284 million per annum over the life of the Project to the Gross Regional Product of the Alice Springs region. In addition, real incomes in the Alice Springs region are expected to rise by \$12 million over the life of the Project.

This increase in demand for goods and services may assist in attracting further businesses to the region. The focus for regional development is likely to be the town of Alice Springs however there is

potential for smaller towns and communities to benefit. Examples might include the provision of fuel, other basic goods and services, transport and logistics, road grading services and so on which could be provided from existing businesses in the local area.

Tourism

The room occupancy rate in the Alice Springs tourism region which is dominated by the town of Alice Springs is currently around 65 per cent which has shown sustained improvement since June 2013 of around 3 per cent per annum. Peak occupancy rates tend to be in the months of August, September and October when occupancy rates reached just under 80 per cent in 2015 (Tourism NT, 2015). This indicates bed availability of around 500 rooms in the region. The Nolans Project will assist in boosting the number of visitors to the area primarily as a result of business related visitors to the Project. This will generate additional demand for accommodation in the town of Alice Springs which, given current vacancy rates, should be sufficient to meet any demand by the Project.

Population

A long term commitment to the region by the resources sector and supporting businesses will assist in supporting the existing workforce in the region and potentially attracting new workers and their families to the region. Job creation as a result of the Nolans Project is expected to increase employment in the Alice Springs region by an average of 18 full time equivalent years per annum. This increase in employment could result in new population moving to the area in the form of workers and their immediate families. New population to the area will contribute to the population of the Local Government Area of Alice Springs which currently has a population of 28,667 and is experiencing population growth of around -0.2 per cent per annum for 2013-14 with forecast population growth expected to remain depressed (NT Government, 2015).

3.6.3 Residual infrastructure

Arafura Resources expects that there could be some residual infrastructure once the life of the Project has ended however, no firm commitments have yet been made. It is possible that the power station could supply electricity to the area and there are possibilities that a regional freight hub could be established.

3.7 Contribution to business development

In construction, the Nolans Project will have a high local content as illustrated in **Table 3.2** which presents the financial assumptions for the Project. An estimated 73 per cent of all construction costs will be spent in Australia. These will primarily include the costs to install the concentrator plant and the intermediate plant (which will be purchased from overseas). Australian businesses will also be involved in the areas of earthworks, road works, construction, transport and logistics, preparing the mine site for mining by removing overburden, and so on.

Some of these goods and services required to construct the Project are expected to be provided by companies in the Northern Territory. Arafura has estimated a local content in the Northern Territory during construction of 12 per cent including a 6 per cent spend in the Alice Springs region. This is equivalent to expenditure of nearly \$145 million in the Northern Territory and \$71 million in the Alice Springs region.

In operation, the Project will have an expected Australian local content of 48 per cent. This is equivalent to expenditure in Australia of over \$90.6 million per annum. Around 21 per cent of the total operations expenditure will be spent in the Northern Territory including 10 per cent in the local Alice Springs region. This is equivalent to an annual expenditure of approximately \$38 million in the Northern Territory and almost \$18 million in the Alice Springs region.

This expenditure during construction and operation represents expended business opportunities for existing businesses as a result of additional work and the ability to contract for work outside of the normal work remit. It also allows the possibility for new businesses to establish themselves in the Northern Territory and in the Alice Springs region. This is particularly relevant given the 40 year life of the Project. The expenditure represents an important boost for local businesses in terms of the

amount being spent and the long term commitment to the region which will allow businesses to make long term commitments and plans.

3.8 Employment and training

The Nolans Project will result in direct and indirect Project employment during construction and operations. This employment will create benefits in terms of employment training. It will also create opportunities for local Aboriginal people to be employed on the Project and to become involved in other ways such as by providing goods and services to the Project.

3.8.1 Direct and indirect employment

Section 3.5 identified the creation of 375 full time equivalent workers over the three year construction period from 2017 to 2020 with peak construction occurring in 2018 when a full time equivalent workforce of nearly 200 workers will be employed. At peak employment, it is expected that 12 workers will be sourced from the Local region and another 6 will be sourced from the rest of the Alice Springs region. The remaining workforce will be sourced from the rest of the Northern Territory or Australia.

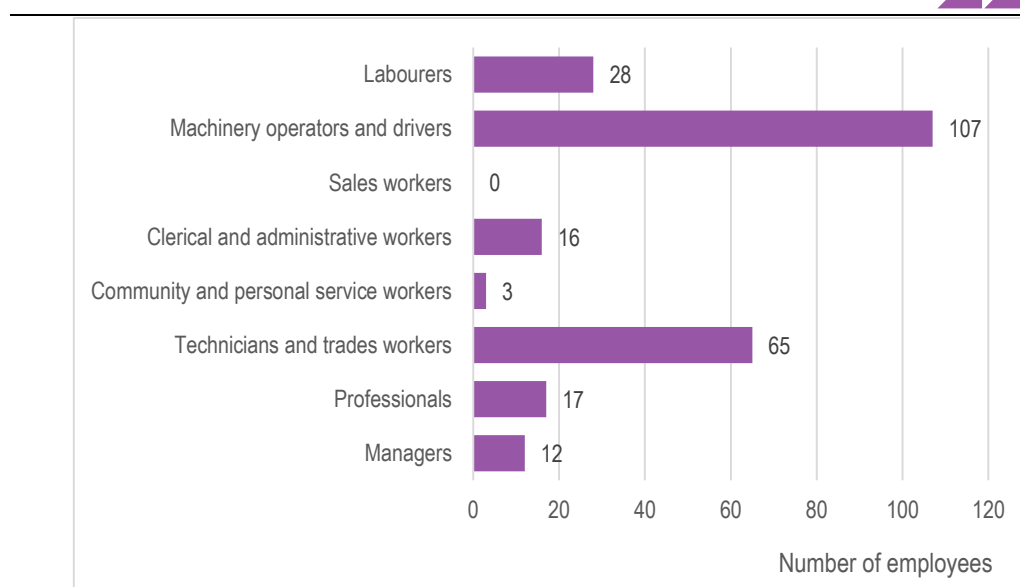
In steady state operations, the Project will directly employ 248 workers. In steady state nearly 40 jobs will be sourced from the surrounding area including 24 from the local area and another 12 from the Alice Springs region. In total, it is expected that nearly 90 workers on the Project will be sourced from the Northern Territory and the remaining 160 will be sourced from Australia.

Job creation expressed in full time equivalent years as a result of the direct and indirect activity of the Nolans Project is expected to result in job creation of 61 in construction or an average of 21 in each year of construction. In operation, it is estimated that almost 360 full time equivalent job years will be created over the 20 year modelled period, an average of 18 per annum.

Over the life of the Project, there will be job creation of 420 in the Alice Springs region, an average of 18 per annum.

3.8.2 Occupation classification

The operation of the Nolans Project will employ around 248 workers. The occupational classification of workers that will be directly hired by the Nolans Project in operation is presented in **Figure 3.8** where the occupational classification is based on the Australian Bureau of Statistics classifications. The Figure shows that the most common occupations that will be employed by the Nolans Project are machinery operators and drivers, and technicians and trades workers. Together these two occupations will employ nearly 70 per cent of the operational workforce.

FIGURE 3.8 OCCUPATIONAL CLASSIFICATION: NOLANS PROJECT: OPERATION

SOURCE: ACIL ALLEN ECONOMIC MODELLING

3.8.3 Employment training

Arafura Resources has identified the need for education and training to create a work ready labour force. Funds have been put aside in the construction and operation phases of the Nolans Project to allow for upfront and ongoing training in the areas of:

- standard courses in Health and Safety, Site Induction, and Equipment and Plant Training
- literacy courses, general training and so on
- training the workforce for the specific processes required of the development.

Process training for workers that are to be employed in each of the plants is expected to comprise the bulk of training.

3.8.4 Aboriginal participation

The proposed Nolans Project is located in an area in which a large number of Aboriginal people live. It is an area where the economy is very limited outside of the town of Alice Springs and where employment choices are limited. As a guide, there are just over 2,000 people living in the Yuendumu – Anmatjere SA2 area which is the area immediately surrounding the Nolans Project. Over 86 per cent of these people are Aboriginal. Around 650 people are currently employed in the area with almost two thirds of the workforce employed in Government Services related industries and only 7 people employed in mining and construction as of the 2011 Census. Thirty per cent of employed people in the area or less than 200 people are Aboriginal. There are currently almost two hundred people seeking work from the area representing a very high unemployment rate of nearly 22 per cent. Assuming the workforce data profile as of the 2011 Census, all of these job seekers are likely to be Aboriginal. Furthermore, it is likely that there are other people from the area that are not currently seeking work due to the low expectation of gaining employment.

The construction and operation of the Nolans Project therefore provides the local Aboriginal population with a number of opportunities including providing employment opportunities. Arafura anticipates that 11 people will be employed from the Yuendumu – Anmatjere SA2 area over the life of the construction period with six local people employed at peak construction. At steady state operations, Arafura expects that 12 people from the local Yuendumu – Anmatjere SA2 area will be employed in each year of operations. Given the employment statistics in the area, it is likely that all of these recruits will be Aboriginal. As well as local Aboriginal people, there will be opportunities for Aboriginal people in the rest of the Northern Territory and Australia to gain employment on the Project.

As a result, the Project represents an opportunity for Aboriginal people from the Yuendumu – Anmatjere SA2 area to obtain work experience in the mining industry in which few people are currently employed. In doing so, it provides them with the skills and experience to gain work on other mining and construction projects that are operating or planned (see Section 3.9) elsewhere in the region. There are four other resources projects planned within 500 km of Alice Springs which could come into production over the 2017 to 2021 period. In addition, there are existing mines in relative proximity to Alice Springs including Newmont's Tanami gold mine located off the Tanami Road to the west of Alice Springs.

Employment on the proposed Nolans Project also presents an opportunity to undertake training and other professional development which will result in an improvement of the skills levels in the area and will further assist local people in their career prospects.

There are also opportunities for Aboriginal people to provide goods and services to support the Project. Examples include providing heritage surveys, assisting with conservation and rehabilitation works, providing maintenance works, participating in cross cultural awareness training, providing administration support, providing catering services and so on.

3.8.5 Overseas recruitment

Arafura intends to purchase the concentrator plant and the intermediate plant for the Nolans site from overseas. In addition, secondary processing of Mixed Rare Earth Oxide and Cerium Carbonate will occur overseas. Despite this, no direct overseas recruitment for the Nolans Project will take place with secondary processing undertaken on a contracting basis.

3.9 Impact of other developments

Table 3.5 presents the proposed resources developments in the area surrounding the Nolans Project. These projects have been identified because they are progressed in their development with construction expected to commence in 2016 or 2017. They are all approximately 500 km from Alice Springs and are therefore considered likely to have some impact on the town particularly the Chandler salt and Tanami gold mines that are located to the south or west of the town. These impacts might include recruiting workers from the town, purchasing goods and services from the town, or making use of the town's infrastructure such as the airport, accommodation, training facilities and health facilities.

TABLE 3.5 PROPOSED RESOURCES DEVELOPMENTS: CENTRAL NORTHERN TERRITORY

Project	Proponent	Construction start date	Operation start date	Location	Construction employment	Operation employment
Nolans Project	Arafura Resources	2017	2019	135 km northwest of Alice Springs	Approx 500	Approx 350
Mt Peake Project - stage 1 - develop new open pit mining and processing operation producing vanadium, titanium pigment and pig iron	TNG Limited	Q2 2016	Q2 2018	235 km north of Alice Springs	Up to 350	175 - 250
Chandler Salt Mine - develop underground mine, on-site salt and fertilizer processing plant	Tellus Holdings	Mine: Q2 2017	Q4 2021	120 km south of Alice Springs	280 - 350	180
Jervois Mine - reopen old mine with 2 open-cut pits and on - site processing plant	KGL Resources	Q2 2017	Q4 2018	Approx 270 km north east of Alice Springs	360	300
Tanami Gold Mine expansion including second decline and increased plant capacity	Newmont	2016	2017	Approx 540 km north west of Alice Springs	na	50

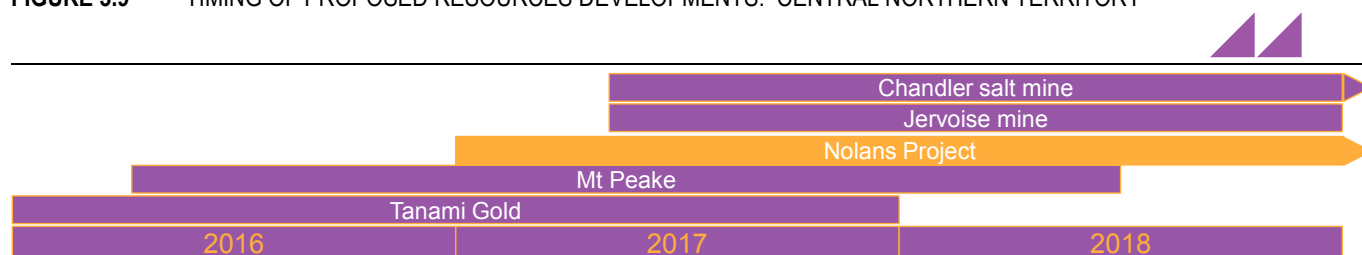
SOURCE: NT GOVERNMENT (NORTHERN TERRITORY ENVIRONMENTAL PROTECTION AUTHORITY, 2015) (NORTHERN TERRITORY GOVERNMENT, 2015).

NOTE: ALL DATES AND EMPLOYMENT FIGURES QUOTED IN THIS TABLE ARE APPROXIMATIONS ONLY

Together these mines represent peak overall construction employment in 2017 of around 400 people and operations employment of 1,100 workers. The timing of each of these developments is presented

graphically in **Figure 3.9**. The Figure highlights the considerable overlap between the Nolans Project and the other four proposed developments during construction. It also shows that there will be a significant increase in demand for operations workers between the period from the end of 2017 when the Tanami Gold Mine expansion is expected to come into operation and the beginning of 2019 when the Nolans Project is expected to come into operation. During this time, four of the proposed developments could come into production representing an increase in direct employment of nearly 900 workers. Given the proximity of Alice Springs to the Nolans Project and the Chandler Salt Mine and the location of the town on the direct route to the Tanami Gold Mine expansion, it is likely that all three proponents will be seeking to source some employees and goods and services from Alice Springs or to locate staff to the town.

FIGURE 3.9 TIMING OF PROPOSED RESOURCES DEVELOPMENTS: CENTRAL NORTHERN TERRITORY



SOURCE: NT GOVERNMENT (NORTHERN TERRITORY ENVIRONMENTAL PROTECTION AUTHORITY, 2015) (NORTHERN TERRITORY GOVERNMENT, 2015).

NOTE: ALL DATES AND EMPLOYMENT FIGURES QUOTED IN THIS FIGURE ARE APPROXIMATIONS ONLY

An analysis of the economy of Alice Springs in Chapter 2 indicates that despite the possibility that a number of proposed resources projects may come on line at the same or similar times, the town of Alice Springs should be able to absorb an increase in demand from the additional developments. In terms of visitor accommodation, the current annual room vacancy rate of 65 per cent and seasonally high vacancy rates of 80 per cent suggest that there are approximately 500 rooms available for overnight accommodation in the town on average which suggests that the current accommodation market could service the demand from the developments assuming that the supply of rooms are of a standard being sought by the industry. A falling housing market in terms of median prices and rental values also indicates there is some flexibility in the market to absorb additional population.

There are currently around 340 people seeking work in the Alice Springs region of which most are located in the town of Alice Springs. This represents an unemployment rate of 1.7 per cent. It is unknown as to what qualifications these job seekers hold or what their career aspirations might hold. However it could mean that there are opportunities for local job seekers to become involved in the construction and operation of these developments and in the flow on jobs created by the developments. It is likely however that projects will seek fly in – fly out workers for part of their workforces. For example, the Tanami gold mine currently employs only fly in – fly out staff and Arafura expects that around 210 of its steady state workers will be employed on a fly in – fly out basis with just under 40 employees sourced from the surrounding region.

Each year the Alice Springs Mining Services Expo showcases mining and related industry opportunities in the Alice Springs and Tennant Creek region. This would indicate that the town of Alice Springs is open to business opportunities associated with the Nolans Project and other possible developments in the region. Arafura has indicated expenditure in the Alice Springs region of around \$71 million in construction and an additional \$18 million per annum in steady state production. There could be pressure on local businesses during the peak construction period if all projects proceed as planned and all have a similar local content. This increase in demand may also attract new businesses to the town particularly given the number of proposed developments which will provide opportunities in construction and operation.



The construction and operation of the proposed Nolans Project in the Northern Territory represents a major investment that will bring significant economic benefits in each phase of the Project. These benefits flow from the direct expenditure and indirect expenditure as a result of the capital expenditure and operational expenditure over the 40 year life of the Project. There will also be economic benefits in the additional employment and business opportunities as a result of the Nolans Project as well as the associated increase in education and training, on the job work experience and business experience gained from working on the Project.

This report estimated the economic impact of the Nolans Project over the three years of construction and 20 years of operation using Computable General Equilibrium modelling. The *Tasman Global* Computable General Equilibrium Model forecasts the direct and indirect impact of the Nolans Project on the value of the economy measured by Gross Product, job creation, taxation and the real incomes of residents. Other economic benefits have been described using economic analysis.

There will be substantial benefits from the Nolans Project to the Alice Springs region in terms of increased Gross Regional Product with most of the increase in contribution to Gross Product from the Project flowing to the region. There will also be small but important benefits to the region in terms of employment creation however most of the impacts in terms of employment will be realised in the rest of Australia (excluding the Northern Territory). The rest of Australia will also benefit significantly from an increase in government revenue and an increase in real incomes.

Over the **life of the Project**, the Nolans Project will create significant economic impacts including:

- Total (direct and indirect) employment creation of around 4,185 full time equivalent job years in Australia, an average of 223 full time equivalent job years per annum. Most of the job creation will occur in the rest of Australia.
- A boost to Gross State Product in the Northern Territory of \$6.4 billion or an average \$280 million each year. The impact on the Gross Regional Product of the Alice Springs region will be even higher at \$6.5 billion or an average of \$284 million each year. In total over the life of the Project, the Gross Domestic Product of Australia will rise by nearly \$7.9 billion, and average of \$342 million each year.
- Increased government revenue for all levels of government include direct royalty payments of around \$280 million, Company taxation of around \$2.5 billion and Payroll taxation of \$39 million including just \$15.5 million paid to the Northern Territory Government.
- On average, over the life of the Project, the Nolans Project will generate direct and indirect taxation of \$4.7 billion or around \$249 million each year.

In the three years of construction, the Nolans Project will result in:

- Capital expenditure of around \$1.19 billion over a three year period from 2017 to 2019 of which \$866 million will be spent in Australia including nearly \$145 million in the Northern Territory. This includes \$71 million of expenditure in the Alice Springs region.

- Direct employment of around 375 full time equivalent workers over the three year construction period beginning in 2017 and peaking at in 2018 which is the second year of construction. At peak construction there will be a full time equivalent workforce of around 200 workers.
- Total (direct and indirect) employment of 82 full time equivalent job years in the Northern Territory and over 675 in Australia over the three years of construction.
- A boost to Gross State Product in the Northern Territory of nearly \$11 million and to Gross Domestic Product in Australia of nearly \$72 million over the three years of construction.
- New business opportunities for local businesses. Whilst the opportunities for the Local region are likely to be fairly limited, they provide an important boost for local businesses particularly as the economic base of the area is relatively narrow.

The operational life of the Project is expected to be in excess of 40 years with steady state production expected to be achieved around 2022 or within three years of operation. In operation the impacts will be of a more long term nature and will contribute to the sustainability of the region and the Northern Territory. These impacts at steady state production have been modelled for **20 years of operation** and will include:

- Operational expenditure (Australian operations only) of around \$188 million per annum in steady state operations of which nearly \$91 million per annum will be spent in Australia. This includes annual expenditure of approximately \$38 million in the Northern Territory and almost \$18 million in the Alice Springs region in steady state.
- The production of around 20,000 tonnes per annum of rare earths products.
- Export revenue of approximately \$520 million per annum.
- Direct employment of around 248 full time equivalent personnel, including 24 from the Local region. In total, around 75 people from the Northern Territory are expected to be directly employed by the Project.
- Total employment creation in the Northern Territory of around 44 full time equivalent job years in each year of steady state operation and 223 per annum in Australia.
- A boost to the Gross Domestic Product of Australia of an average of \$390 million per year in each year of operation. Nearly all of the impacts from the Nolans Project in operation will be realised in the Alice Springs region. While the total impact in the Northern Territory will be \$321 million per annum, the Gross State Product of the Alice Springs region will rise by an average of \$326 million per year.
- Employment and training opportunities particularly for people from the Local region where there are limited employment opportunities and a very high unemployment rate for people living outside of the Alice Springs Local Government area. Employment and training opportunities also represent important opportunities in developing the career potential of local people.
- New business opportunities for local businesses in the Northern Territory. In addition, there is an opportunity for these businesses to undertake longer term planning in order to take advantage of the long term nature of the development.
- Increased government revenue for all levels of government include direct royalty payments of around \$15.4 million per year and \$138 million per year in Company taxation in steady state operation. In addition, nearly \$1.9 million per year of Payroll taxation will be payable by the Project including just over \$650,000 per annum paid to the Northern Territory Government in steady state operation.

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ACIL Allen's computable general equilibrium model *Tasman Global* is a powerful tool for undertaking economic impact analysis at the regional, state, national and global level.

There are various types of economic models and modelling techniques. Many of these are based on partial equilibrium analysis that usually considers a single market. However, in economic analysis, linkages between markets and how these linkages develop and change over time can be critical. *Tasman Global* has been developed to meet this need.

Tasman Global is a large-scale computable general equilibrium model which is designed to account for all sectors within an economy and all economies in the world. ACIL Allen uses this modelling platform to undertake industry, project, scenario and policy analyses. The model is able to analyse issues at the industry, global, national, state and regional levels to determine the impacts of various economic changes on production, consumption and trade at the macroeconomic and industry level.

A dynamic model

Tasman Global is a model that estimates relationships between variables at different points in time. This is in contrast to comparative static models, which compare two equilibriums (one before a policy change and one following). A dynamic model such as *Tasman Global* is beneficial when analysing issues where both the timing of and the adjustment path that economies follow are relevant in the analysis.

The database

A key advantage of *Tasman Global* is the level of detail in the database underpinning the model. The database is derived from the latest Global Trade Analysis Project (GTAP) database (version 8.1). This database is a fully documented, publicly available global data base which contains complete bilateral trade information, transport and protection linkages among regions for all GTAP commodities.

The GTAP model was constructed at the Centre for Global Trade Analysis at Purdue University in the United States. It is the most up-to-date, detailed database of its type in the world.

Tasman Global builds on the GTAP model's equation structure and database by adding the following important features:

- dynamics (including detailed population and labour market dynamics)
- detailed technology representation within key industries (such as electricity generation and iron and steel production)
- disaggregation of a range of major commodities including iron ore, bauxite, alumina, primary aluminium, brown coal, black coal and LNG
- the ability to repatriate labour and capital income
- a detailed emissions accounting abatement framework

- explicit representation of the states and territories of Australia
- the capacity to explicitly represent multiple regions within states and territories of Australia

Nominally the *Tasman Global* database divides the world economy into 141 regions (133 international regions plus the 8 states and territories of Australia) although in reality the regions are frequently disaggregated further. ACIL Allen regularly models Australian projects or policies at the regional level.

TABLE A.1 SECTORS IN THE TASMAN GLOBAL DATABASE

Sector	Sector
1 Paddy rice	36 Paper products, publishing
2 Wheat	37 Diesel (incl. nonconventional diesel)
3 Cereal grains nec	38 Other petroleum, coal products
4 Vegetables, fruit, nuts	39 Chemical, rubber, plastic products
5 Oil seeds	40 Iron ore
6 Sugar cane, sugar beef	41 Bauxite
7 Plant- based fibres	42 Mineral products nec
8 Crops nec	43 Ferrous metals
9 Bovine cattle, sheep, goats, horses	44 Alumina
10 Animal products nec	45 Primary aluminium
11 Raw milk	46 Metals nec
12 Wool, silk worm cocoons	47 Metal products
13 Forestry	48 Motor vehicle and parts
14 Fishing	49 Transport equipment nec
15 Brown coal	50 Electronic equipment
16 Black coal	51 Machinery and equipment nec
17 Oil	52 Manufactures nec
18 Liquefied natural gas (LNG)	53 Electricity generation
19 Other natural gas	54 Electricity transmission and distribution
20 Minerals nec	55 Gas manufacture, distribution
21 Bovine meat products	56 Water
22 Meat products nec	57 Construction
23 Vegetables oils and fats	58 Trade
24 Dairy products	59 Road transport
25 Processed rice	60 Rail and pipeline transport
26 Sugar	61 Water transport
27 Food products nec	62 Air transport
28 Wine	63 Transport nec
29 Beer	64 Communication
30 Spirits and RTDs	65 Financial services nec
31 Other beverages and tobacco products	66 Insurance
32 Textiles	67 Business services nec
33 Wearing apparel	68 Recreational and other services
34 Leather products	69 Public Administration, Defence, Education, Health
35 Wood products	70 Dwellings

Note: nec = not elsewhere classified.

The *Tasman Global* database also contains a wealth of sectoral detail currently identifying up to 70 industries (Table A.1). The foundation of this information is the input-output tables that underpin the database. The input-output tables account for the distribution of industry production to satisfy industry and final demands. Industry demands, so-called intermediate usage, are the demands from each industry for inputs.

For example, electricity is an input into the production of communications. In other words, the communications industry uses electricity as an intermediate input. Final demands are those made by households, governments, investors and foreigners (export demand). These final demands, as the name suggests, represent the demand for finished goods and services. To continue the example, electricity is used by households – their consumption of electricity is a final demand.

Each sector in the economy is typically assumed to produce one commodity, although in *Tasman Global*, the electricity, transport and iron and steel sectors are modelled using a ‘technology bundle’ approach. With this approach, different known production methods are used to generate a homogeneous output for the ‘technology bundle’ industry. For example, electricity can be generated using brown coal, black coal, petroleum, base load gas, peak load gas, nuclear, hydro, geothermal, biomass, wind, solar or other renewable based technologies – each of which have their own cost structure.

The other key feature of the database is that the cost structure of each industry is also represented in detail. Each industry purchases intermediate inputs (from domestic and imported sources) primary factors (labour, capital, land and natural resources) as well as paying taxes or receiving subsidies.

Factors of production

Capital, land, labour and natural resources are the four primary factors of production. The capital stock in each region (country or group of countries) accumulates through investment (less depreciation) in each period. Land is used only in agriculture industries and is fixed in each region. *Tasman Global* explicitly models natural resource inputs as a sector specific factor of production in resource based sectors (coal mining, oil and gas extraction, other mining, forestry and fishing).

Population growth and labour supply

Population growth is an important determinant of economic growth through the supply of labour and the demand for final goods and services. Population growth for the 112 international regions and for the 8 states and territories of Australia represented in the *Tasman Global* database is projected using ACIL Allen’s in-house demographic model. The demographic model projects how the population in each region grows and how age and gender composition changes over time and is an important tool for determining the changes in regional labour supply and total population over the projection period.

For each of the 120 regions in *Tasman Global*, the model projects the changes in age-specific birth, mortality and net migration rates by gender for 101 age cohorts (0-99 and 100+). The demographic model also projects changes in participation rates by gender by age for each region, and, when combined with the age and gender composition of the population, endogenously projects the future supply of labour in each region. Changes in life expectancy are a function of income per person as well as assumed technical progress on lowering mortality rates for a given income (for example, reducing malaria-related mortality through better medicines, education, governance, etc.). Participation rates are a function of life expectancy as well as expected changes in higher education rates, fertility rates and changes in the workforce as a share of the total population.

Labour supply is derived from the combination of the projected regional population by age by gender and the projected regional participation rates by age by gender. Over the projection period labour supply in most developed economies is projected to grow slower than total population as a result of ageing population effects.

For the Australian states and territories, the projected aggregate labour supply from ACIL Allen’s demographics module is used as the base level potential workforce for the detailed Australian labour market module, which is described in the next section.

The Australian labour market

Tasman Global has a detailed representation of the Australian labour market which has been designed to capture:

- different occupations
- changes to participation rates (or average hours worked) due to changes in real wages

- changes to unemployment rates due to changes in labour demand
- limited substitution between occupations by the firms demanding labour and by the individuals supplying labour
- limited labour mobility between states and regions within each state.

Tasman Global recognises 97 different occupations within Australia – although the exact number of occupations depends on the aggregation. The firms who hire labour are provided with some limited scope to change between these 97 labour types as the relative real wage between them changes. Similarly, the individuals supplying labour have a limited ability to change occupations in response to the changing relative real wage between occupations. Finally, as the real wage for a given occupation rises in one state relative to other states, workers are given some ability to respond by shifting their location. The model produces results at the 97 3-digit ANZSCO (Australian New Zealand Standard Classification of Occupations) level which are presented in Table A.2.

The labour market structure of *Tasman Global* is thus designed to capture the reality of labour markets in Australia, where supply and demand at the occupational level do adjust, but within limits.

Labour supply in *Tasman Global* is presented as a three stage process:

1. labour makes itself available to the workforce based on movements in the real wage and the unemployment rate;
2. labour chooses between occupations in a state based on relative real wages within the state; and
3. labour of a given occupation chooses in which state to locate based on movements in the relative real wage for that occupation between states.

By default, *Tasman Global*, like all CGE models, assumes that markets clear. Therefore, overall, supply and demand for different occupations will equate (as is the case in other markets in the model).

Greenhouse gas emissions

The model has a detailed greenhouse gas emissions accounting, trading and abatement framework that tracks the status of six anthropogenic greenhouse gases (namely, carbon dioxide, methane, nitrous oxide, HFCs, PFCs and SF6). Almost all sources and sectors are represented; emissions from agricultural residues and land-use change and forestry activities are not explicitly modelled.

The greenhouse modelling framework not only allows accounting of changes in greenhouse gas emissions, but also allows various policy responses such as carbon taxes or emissions trading to be employed and assessed within a consistent framework. For example, the model can be used to measure the economic and emission impacts of a fixed emissions penalty in single or multiple regions whether trading is allowed or not. Or, it can be used to model the emissions penalty required to achieve a desired cut in emissions based on various trading and taxation criteria.

Detailed energy sector and linkage to *PowerMark* and *GasMark*

Tasman Global contains a detailed representation of the energy sector, particularly in relation to the interstate (trade in electricity and gas) and international linkages across the regions represented. To allow for more detailed electricity sector analysis, and to aid in linkages to bottom-up models such as ACIL Allen's *GasMark* and *PowerMark* models, electricity generation is separated from transmission and distribution in the model. In addition, the electricity sector in the model employs a 'technology bundle' approach that separately identifies up to twelve different electricity generation technologies:

1. brown coal (with and without carbon capture and storage)
2. black coal (with and without carbon capture and storage)
3. petroleum
4. base load gas (with and without carbon capture and storage)
5. peak load gas
6. hydro
7. geothermal
8. nuclear

9. biomass
10. wind
11. solar
12. other renewables.

To enable more accurate linking to *PowerMark*, the generation cost of each technology is assumed to be equal to their long run marginal cost while the sales price in each region is matched to the average annual dispatch weighted prices projected by *PowerMark* – with any difference being returned as an economic rent to electricity generators. This representation enables the highly detailed market based projections from *PowerMark* to be incorporated as accurately as possible into *Tasman Global*.

TABLE A.2 OCCUPATIONS IN THE TASMAN GLOBAL DATABASE, ANZSCO 3-DIGIT LEVEL (MINOR GROUPS)

ANZSCO code, Description	ANZSCO code, Description	ANZSCO code, Description
1. MANAGERS	3. TECHNICIANS & TRADES WORKERS	5. CLERICAL & ADMINISTRATIVE
111 Chief Executives, General Managers and Legislators	311 Agricultural, Medical and Science Technicians	511 Contract, Program and Project Administrators
121 Farmers and Farm Managers	312 Building and Engineering Technicians	512 Office and Practice Managers
131 Advertising and Sales Managers	313 ICT and Telecommunications Technicians	521 Personal Assistants and Secretaries
132 Business Administration Managers	321 Automotive Electricians and Mechanics	531 General Clerks
133 Construction, Distribution and Production Managers	322 Fabrication Engineering Trades Workers	532 Keyboard Operators
134 Education, Health and Welfare Services Managers	323 Mechanical Engineering Trades Workers	541 Call or Contact Centre Information Clerks
135 ICT Managers	324 Panel beaters, and Vehicle Body Builders, Trimmers and Painters	542 Receptionists
139 Miscellaneous Specialist Managers	331 Bricklayers, and Carpenters and Joiners	551 Accounting Clerks and Bookkeepers
141 Accommodation and Hospitality Managers	332 Floor Finishers and Painting Trades Workers	552 Financial and Insurance Clerks
142 Retail Managers	333 Glaziers, Plasterers and Tilers	561 Clerical and Office Support Workers
149 Miscellaneous Hospitality, Retail and Service Managers	334 Plumbers	591 Logistics Clerks
	341 Electricians	599 Miscellaneous Clerical and Administrative Workers
2. PROFESSIONALS	342 Electronics and Telecommunications Trades Workers	
211 Arts Professionals	351 Food Trades Workers	6. SALES WORKERS
212 Media Professionals	361 Animal Attendants and Trainers, and Shearers	611 Insurance Agents and Sales Representatives
221 Accountants, Auditors and Company Secretaries	362 Horticultural Trades Workers	612 Real Estate Sales Agents
222 Financial Brokers and Dealers, and Investment Advisers	391 Hairdressers	621 Sales Assistants and Salespersons
223 Human Resource and Training Professionals	392 Printing Trades Workers	631 Checkout Operators and Office Cashiers
224 Information and Organisation Professionals	393 Textile, Clothing and Footwear Trades Workers	639 Miscellaneous Sales Support Workers
225 Sales, Marketing and Public Relations Professionals	394 Wood Trades Workers	
231 Air and Marine Transport Professionals	399 Miscellaneous Technicians and Trades Workers	7. MACHINERY OPERATORS & DRIVERS
232 Architects, Designers, Planners and Surveyors		711 Machine Operators
233 Engineering Professionals	4. COMMUNITY & PERSONAL SERVICE	712 Stationary Plant Operators
234 Natural and Physical Science Professionals	411 Health and Welfare Support Workers	721 Mobile Plant Operators
241 School Teachers	421 Child Carers	731 Automobile, Bus and Rail Drivers
242 Tertiary Education Teachers	422 Education Aides	732 Delivery Drivers
249 Miscellaneous Education Professionals	423 Personal Carers and Assistants	733 Truck Drivers
251 Health Diagnostic and Promotion Professionals	431 Hospitality Workers	741 Storepersons
252 Health Therapy Professionals	441 Defence Force Members, Fire Fighters and Police	
253 Medical Practitioners	442 Prison and Security Officers	8. LABOURERS
254 Midwifery and Nursing Professionals	451 Personal Service and Travel Workers	811 Cleaners and Laundry Workers
261 Business and Systems Analysts, and Programmers	452 Sports and Fitness Workers	821 Construction and Mining Labourers
262 Database and Systems Administrators, and ICT Security Specialists		831 Food Process Workers
263 ICT Network and Support Professionals		832 Packers and Product Assemblers
271 Legal Professionals		839 Miscellaneous Factory Process Workers
272 Social and Welfare Professionals		841 Farm, Forestry and Garden Workers
		851 Food Preparation Assistants
		891 Freight Handlers and Shelf Fillers
		899 Miscellaneous Labourers

SOURCE: ABS (2009), ANZSCO – AUSTRALIAN AND NEW ZEALAND STANDARD CLASSIFICATIONS OF OCCUPATIONS, FIRST EDITION, REVISION 1, ABS CATALOGUE NO. 1220.0.

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